# MAINTENANCE SERVICE MANUAL FT-101ZD

385



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# INDEX

## SECTOPM 4 – REPAIR PARTS



## SECTION 5 – LATE MODEL UPDATE

# SECTION 1 – GENERAL

# HIGH-PERFORMANCE HF TRANSCEIVER
# YAESU FT-101ZD



## GENERAL DESCRIPTION

The FT-101Z series was introduced early in 1979 as the culmination of a decade of experience with the FT-101 series. Borrowing heavily from the highly regarded FT-901 series, the FT-101Z series brings together a number of "top of the line" features at a "bottom of the line" price.

As with the FT-901, the receiver section of the FT-101Z is particularly impressive. Careful gain distribution has produced wide dynamic range, without compromising sensitivity. Variable IF bandwidth allows continuous adjustment of the width of the IF passband from 300 Hz to 2.4 kHz, and an all-new noise blanker provides significantly improved blanking capability.

The transmit side includes a high-performance RF speech processor, which provides a significant increase in average power without the distortion found in some AF clipping systems used in other makes of equipment. The final tubes utilize RF negative feedback, for improved linearity.

Built into every FT-101ZD transceiver are digital plus analog readout of the operating frequency, VOX, semi-break-in CW with sidetone, a 25 kHz crystal calibrator, selectable AGC, and a 10 dB/20 dB attenuator in the receive line. For the economy FT-101Z model, the counter and display units are options, which may easily be added at a later date, should you decide to upgrade your station.

Compatibility with the FT-901DM series accessories lets you take advantage of such advanced features as the scanning and memory of the FV-901DM external synthesized VFO; the FTV-901R VHF/UHF transverter; and the YO-901 Multiscope. Read on for details of these accessories and their use with the FT-101Z.

All circuits, except for the driver and final amplifier tubes, are solid state. If the ratings of the solid state devices are not exceeded, they will exhibit practically infinite lifetimes. The FT-101Z series may be operated from AC supplies of 100/110/117/200/220/234 volts, and a DC-DC converter is an available option.

The pages to follow will describe more fully the high-performance features and ease of operation of the FT-101ZD. For today's active amateur, the 101Z series is, indeed, "THE RADIO."

# SPECIFICATIONS

**Frequency coverage:**

| | |
|---|---|
| 160 m | 1.8 - 2.0 MHz |
| 80 m | 3.5 - 4.0 MHz |
| 40 m | 7.0 - 7.5 MHz |
| ▲ 30 m | 10.0 - 10.5 MHz |
| 20 m | 14.0 - 14.5 MHz |
| ▲ 17 m | 18.0 - 18.5 MHz |
| 15 m | 21.0 - 21.5 MHz |
| ▲ 12 m | 24.5 - 25.0 MHz |
| 10 m | 28.0 - 29.9 MHz |

(▲ After Prod. #17)

**Power requirements:**
AC 100/110/117/200/220/234 volts, 50/60 Hz
DC 13.5 volts ± 10%
(DC-DC converter optional)

**Power consumption:**
AC 85 VA receive
(73 VA HEATER OFF)
330 VA transmit
DC 5.5 amps receive
(1.1 amps HEATER OFF)
21 amps transmit

**Size:**
345 (W) x 157 (H) x 326 (D) mm

**Weight:**
Approx. 15 kg.



## TRANSMITTER

**Emission type:**
LSB, USB, CW, AM▲▲, FM▲▲
(AM... After Prod. #8, AM or FM... After Prod. #24)

**Power input:**
180 watts DC (SSB, CW)
50 watts DC (AM, FM)

**Carrier suppression:**
Better than 40 dB

**Unwanted sideband suppression:**
Better than 40 dB (14 MHz, 1 kHz)

**Spurious radiation:**
Better than 40 dB down

**Transmitter frequency response:**
300 - 2700 Hz (−6 dB)

**Third order distortion products:**
Better than 31 dB down

**Transmitter frequency stability:**
Less than 300 Hz after 10 minute warmup; less than 100 Hz after 30 minute warmup.

**Antenna output impedance:**
50 - 75 ohms, unbalanced

**Modulation:**
A3J : Balanced modulator
A3 : Amplitude modulation of a low power stage
F3 : Variable-reactance frequency modulation, max. deviation ± 5 kHz.

**Microphone input impedance:**
500 - 600 ohms (low impedance)

## RECEIVER

**Sensitivity:**
0.25 μV for S/N 10 dB (SSB, CW)
0.5 μV for S/N 10 dB (AM)
0.3 μV for 20 dB noise quieting (FM)

**Image rejection:**
Better than 60 dB (160 - 12 m)
Better than 50 dB (10 m)

**IF rejection:**
Better than 70 dB (160, 80, 20 - 10 m)
Better than 60 dB (40 m, 30 m)

**Selectivity:**

| | |
|---|---|
| SSB | 2.4 kHz (−6 dB); 4.0 kHz (−60 dB) |
| CW* | 0.6 kHz (−6 dB); 1.2 kHz (−60 dB) |
| CW** | 350 Hz (−6 dB); 1.2 kHz (−60 dB) |
| AM*** | 3.6 kHz (−6 dB); 6.8 kHz (−60 dB) |
| FM*** | 12 kHz (−6 dB); 24 kHz (−60 dB) |

**Bandwidth control:**
Continuous from 2.4 kHz to 300 Hz

**Audio output impedance:**
4 - 16 ohms

**Audio output:**
3 watts at 10% THD, 4 ohm load

* with optional 600 Hz CW filter
** with optional 350 Hz CW filter
*** with optional unit

Specifications subject to change without notice.

# TUBES AND SEMICONDUCTORS

**Vacuum Tubes**

| | |
|---|---|
| 12BY7A | 1 |
| 6146B | 2 |

**Transistors**

| | |
|---|---|
| T20A6* | 2 |
| 2SA495 | 1 |
| 2SA496Y | 2 |
| 2SA564A | 3 |
| 2SA639 | 1 |
| 2SA733 | 1 |
| 2SA952L | 13 |
| 2S3616 | 1 |
| 2SC372Y | 25 |
| 2SC373 | 2 |
| 2SC380TMY | 3 |
| 2SC535A | 1 |
| 2SC732TMGR | 1 |
| 2SC1000GR | 2 |
| 2SC1383 | 1 |
| 2SC1583 | 2 |
| 2SC1674L | 1 |
| 2SC1815Y | 6 |
| 2SC1815GR | 1 |
| 2SC2407 | 2 |
| MPSA13 | 1 |

**Field Effect Transistors**

| | |
|---|---|
| 2SK19GR | 9 |
| 2SK19BL | 1 |
| 3SK40M | 1 |
| 3SK51-03 | 7 |
| 3SK73 | 1 |
| J310 | 2 |

**Integrated Circuits (IC)**

| | |
|---|---|
| μPA54H | 1 |
| μPC78L05 | 1 |
| μPC78L12 | 1 |
| μPC7805H | 1 |
| μPC14308 | 1 |
| μPC2002H | 1 |
| MC3403P | 1 |
| MC14024B | 1 |
| MSM9520RS | 1 |
| SN76514N | 1 |
| SN74LS123N | 1 |
| TA7060P | 1 |
| TA7063P | 1 |

**Germanium Diodes**

| | |
|---|---|
| 1N60 | 11 |
| 1S1007(GB) | 11 |

**Schottky Barrier Diode**

| | |
|---|---|
| ND487C2-3R | 1 |

**Silicon Diodes**

| | |
|---|---|
| 1S1555 | 80 |
| 10D1 | 8 |
| 10D10 | 8 |
| V06B | 2 |
| 1SS53 | 6 |

**Varactor Diodes**

| | |
|---|---|
| 1S2209 | 1 |
| 1S2236 | 1 |
| FC63 | 1 |

**Zener Diodes**

| | |
|---|---|
| WZ061 | 1 |
| WZ090 | 2 |

**Light Emitting Diodes**

| | |
|---|---|
| GD4-203SRD | 9 |

**LED Display**

| | |
|---|---|
| HP5082-7623 | 6 |

**FM Unit**

**IC**

| | |
|---|---|
| μPC577H | 1 |

**Field Effect Transistors**

| | |
|---|---|
| 2SK125 | 1 |
| 3SK51-03 | 1 |

**Transistors**

| | |
|---|---|
| 2SA733Q | 1 |
| 2SC535B | 1 |
| 2SC945Q | 13 |

**Diodes**

| | |
|---|---|
| 1S188FM | 4 |
| 1S1555 | 1 |
| 1SS53 | 8 |
| FC63 | 1 |
| MV103 | 1 |

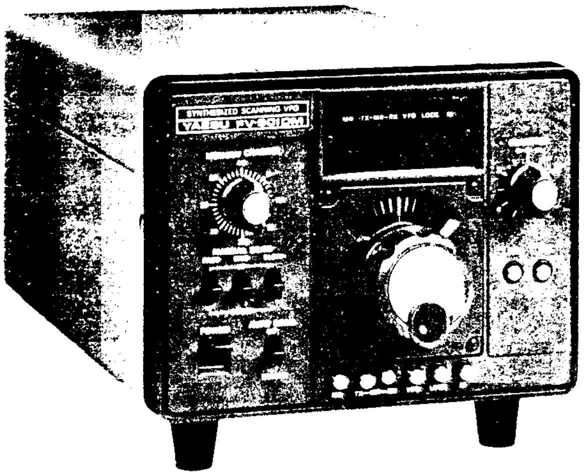
# FT-101ZD SERIES MODEL CHART

O = BUILT-IN FEATURE X = AVAILABLE OPTION

| FEATURE | FT-101ZD | FT-101Z |
|---|---|---|
| ALL BAND CRYSTALS | O | O |
| COUNTER UNIT | O | X |
| DC-DC CONVERTER | X | X |
| CW FILTER | X | X |
| MICROPHONE | X | X |
| RF PROCESSOR | O | O |
| COOLING FAN | X | X |
| *AM UNIT (After Prod. #8) | X | X |
| *FM UNIT (After Prod. #24) | X | X |

*Either FM or AM Unit can be installed in your FT-101ZD.

# RECOMMENDED ACCESSORIES



FV-901DM





FTV-901R

## FV-901DM SYNTHESIZED, SCANNING REMOTE VFO

The FV-901DM external VFO provides a synthesized control system for your FT-101ZD station. A three-speed scanner will take you anywhere in the band instantly, and the auto-scan feature will sweep the band until it finds a signal.

The 100 Hz steps of the synthesizer are coupled with a 40-frequency memory bank, allowing wide versatility for contest, DX, or net operation. The TX/RX clarifier allows offset from either dial or memory frequencies, for precise tuning.

Because there is no display provided on the FV-901DM, it is not readily possible to use this unit with the analog FT-101Z, as the operating frequency cannot be determined.

## FTV-901 VHF/UHF/OSCAR TRANSVERTER

In another Yaesu "first," the FTV-901R brings together three bands in the VHF and UHF regions, all in one compact case. The basic FTV-901R comes equipped for 144–148 MHz, and the 6 meter and 70 cm modules may be added as options.

The satellite 1–3 bands provide operation on OSCAR Modes A/B/J, on full duplex, when an external receiver is used. Of course, the FT-221R or FT-225RD transceivers may be used for transmission on the OSCAR 145 MHz uplink. In this case, your FTV-901R can be used for instant QSY between 29 MHz, 145 MHz, and 435 MHz.

Repeater split is provided on 6 and 2 meters.



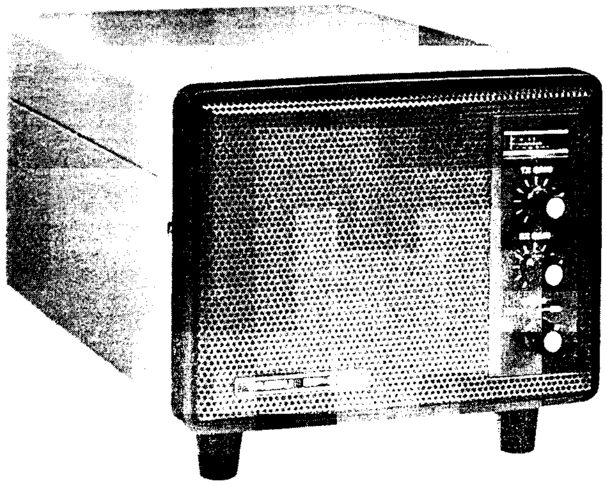

YO-901

## YO-901 MULTISCOPE

The YO-901 Multiscope provides superb monitoring capability, with instant interface to your FT-101ZD station. Output signal monitoring, trapezoidal and two-tone tests, and general oscilloscope measurements are made with ease with the YO-901.

A panoramic adapter, known as the Band Scope, is an available option, allowing quick examination of the band for activity.

IF TX and RX monitoring is not possible with the FT-101ZD/YO-901 combination.



SP-901P

## SP-901P SPEAKER/HYBRID PHONE PATCH

The SP-901P features a shaped-response loudspeaker, and the hybrid phone patch allows efficient operation during patches. Styling and size match the FT-101Z series.

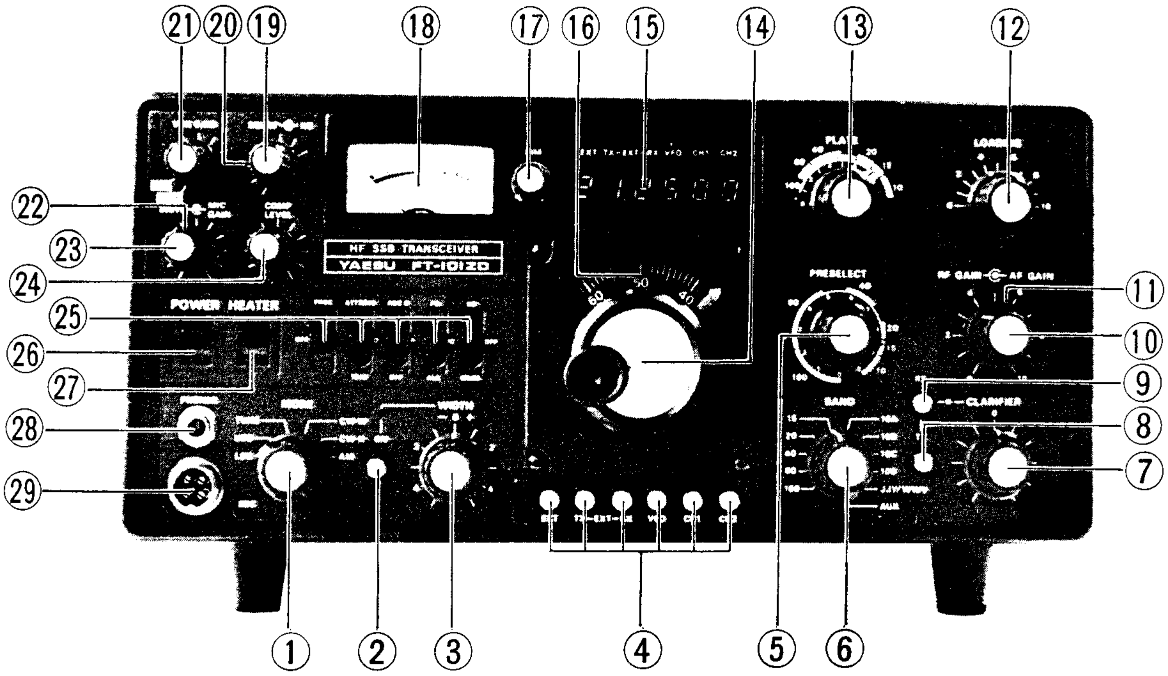



FC-901

## FC-901 ANTENNA COUPLER

Present a 50 ohm load to your FT-101ZD transceiver all across the band with the FC-901 antenna coupler. As many as three coax-fed antennas, and one random wire antenna, may be accommodated. SWR and power metering allow quick determination of proper matching conditions.

## CONTROLS AND SWITCHES




**(1) MODE**

Selection of LSB, USB, CW-W (SSB filter), CW-N (optional CW filter) and AM is provided.

**(2) WIDTH ON**

When this button is pressed, the variable bandwidth function is activated.

**(3) WIDTH**

This control varies the IF bandwidth from 2.4 kHz down to 300 Hz. When the WIDTH switch is OFF, the bandwidth is fixed by the filter selected at the MODE switch.

**(4) SELECT switches**

When using the optional FV-901DM synthesized, scanning external VFO, these switches determine which component will control the transmit, receive, or transceive frequency.

EXT...... This switch, when pressed, shifts control of the transceive frequency to the external VFO.

TX EXT... This switch, when pressed, shifts control of the transmit frequency to the external VFO.

RX EXT... This switch, when pressed, shifts control of the receive frequency to the external VFO.

VFO...... This switch selects control of the transceive frequency on the FT-101ZD internal VFO.

CH1, CH2.. These switches select optional fixed channels, transceive only.

**(5) PRESELECT**

The preselector control peaks the RF and IF stages for the frequency in use.

**(6) BAND**

The bandswitch selects the frequency band in use: 160 - 10 meters, plus WWV/JJY 5 MHz.

**(7) CLARIFIER**

The clarifier control allows offset of ±2.5 kHz from the frequency established by the main tuning dial.

**(8) (9) CLARIFIER SELECT switches**

Press the RX button for offset of the receive frequency.
Press the TX button for offset of the transmit frequency.
Press both buttons for offset of the transceive frequency.

**(10) AF GAIN**

The AF GAIN control varies the output level of the audio amplifier stages. Clockwise rotation increases the audio output level.

**(11) RF GAIN**

The RF GAIN control varies the gain of the RF and IF stages. Clockwise rotation increases the gain of these stages.

**(12) LOADING**

This control tunes the output circuit of the final amplifier pi network to match the feedpoint impedance of the load.

**(13) PLATE**

This control tunes the plate circuit of the final amplifier.

**(14) MAIN TUNING KNOB**

Rotation of this knob selects the operating frequency, in conjunction with the setting of the bandswitch. One revolution of the dial produces a frequency change of approximately 17 kHz.

**(15) DIGITAL DISPLAY**

The digital display reads out the operating frequency, with resolution to 100 Hz. The display unit is built into the FT-101ZD, and is an available option for the FT-101Z.

**(16) ANALOG DIAL**

The analog dial allows readout of the operating frequency to better than 1 kHz. The combination of the precision dial mechanism and drive unit provides zero backlash at slow tuning rates.

**(17) DIM**

This control allows dimming of the meter and dial lamps.

**(18) METER**

The meter displays final amplifier cathode current (IC), relative power output (PO), and ALC feedback voltage.

**(19) NB**

This control varies the threshold point for the noise blanker, and should be set to the minimum point that provides the desired blanking action.

**(20) DELAY**

This control sets the delay time for the VOX relay. For voice-actuated SSB, or semi-break-in CW, the operator may select the delay time most suitable for his or her operating habits.

**(21) VOX GAIN**

The threshold level for the VOX (voice operated relay) system can be varied using this control. In the PTT position, PTT (push to talk) control is provided, for relay control via the microphone PTT switch or footswitch.

**(22) DRIVE**

This control sets the carrier level for CW/AM and tuning purposes. When the RF processor is ON, this control varies the RF output on SSB, as well.

**(23) MIC GAIN**

This control sets the output level of the microphone amplifier stage. Clockwise rotation increases the mic gain level.

**(24) COMP LEVEL**

This control varies the compression level for the built-in RF speech processor. The processor does not function in the AM mode.

**(25) FUNCTION switches**

PROC ........ This switch activates the RF speech processor.

ATT .......... This switch allows the insertion of 10 or 20 dB attenuators in the incoming signal path.

AGC S/F/OFF .. This switch allows selection of the desired AGC decay time. In the OFF position, the AGC is switched off, and the S-meter will not function.

PO/IC/ALC .... In the PO position, relative power output is displayed on the meter. In the IC position, final amplifier cathode current is displayed. In the ALC position, ALC voltage is displayed. Regardless of the setting of the meter switch, the meter functions as an S-meter on receive.

NB/MARK ..... In the NB position, the noise blanker is activated. In the MARK position, the internal crystal calibrator is activated.

### (26) POWER

This is the main ON/OFF switch for the transceiver.

### (27) HEATER

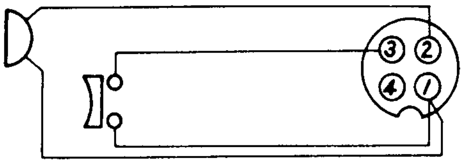
With the HEATER switch on, heater voltage is applied to the driver and final amplifier tubes. This switch may be turned off during periods of RX, when energy conservation is critical.

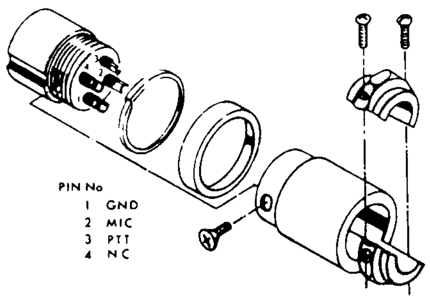
### (28) PHONES

This is a standard ¼" phone jack for use with headphones.

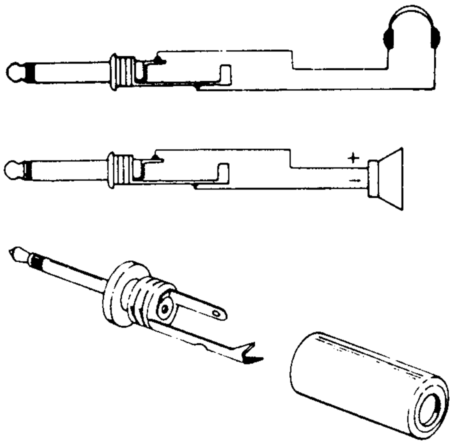
### (29) MIC

This is a 4 conductor jack for microphone and PTT input.

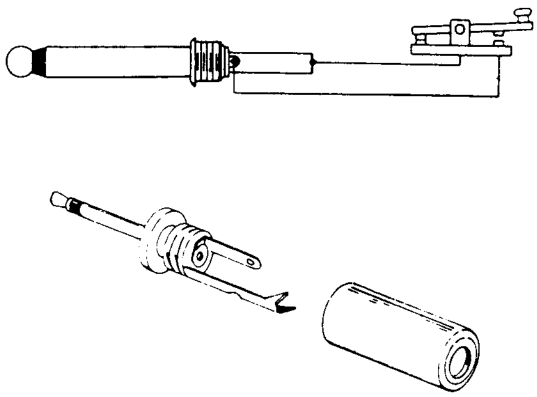


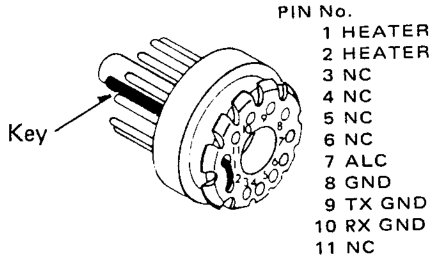

Mic plug



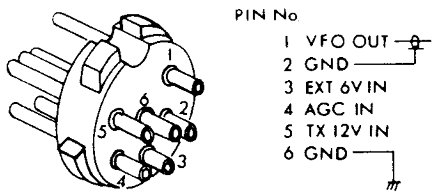
Headphone and external speaker plug



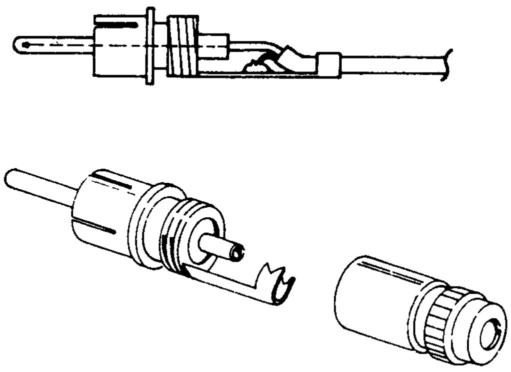
Key plug




ACC plug (After Prod. #24)

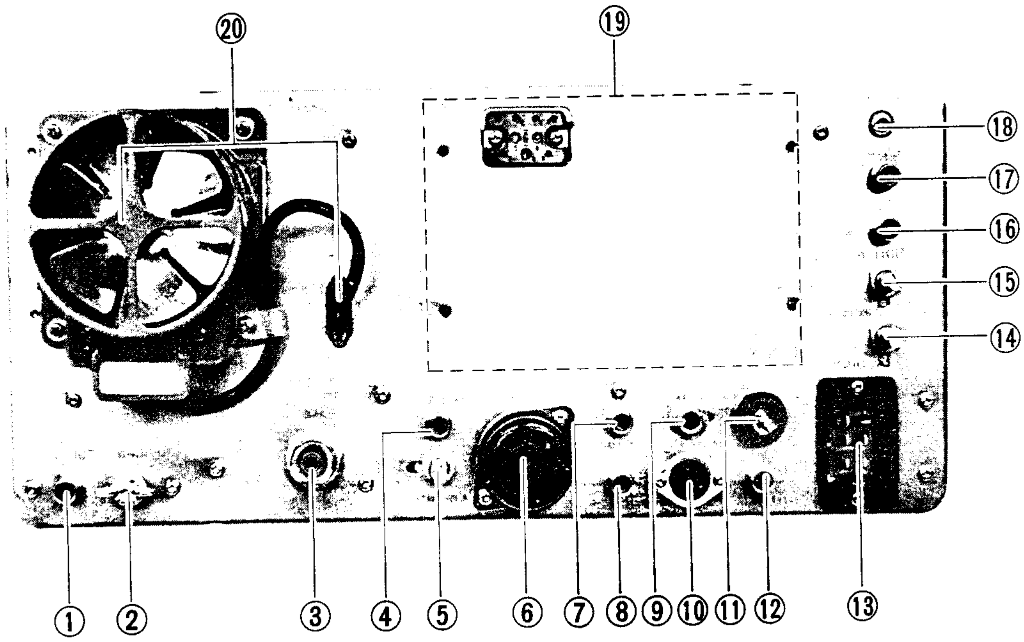



VFO Plug



Pin plug

# REAR APRON




(1) **RF OUT**

RF output of 3 volts RMS is available at this jack for use with a transverter. Output is from the driver stage.

(2) **GND**

For best transceiver performance, as well as protection from electrical shock, a good ground connection should be made at this point, using a heavy, braided wire of the shortest length possible.

(3) **ANT**

Standard "UHF" connector for the antenna.

(4) **RCV ANT**

This jack is switched in parallel with the ANT jack on receive, for use with an external receiver.

(5) **PO ADJ**

This control adjusts the relative power output meter.

(6) **ACC**

Transceiver operating voltages and relay connections can be accessed through the accessory jack. Please insert the ACC plug at all times, to provide heater voltage for the driver and final amplifier tubes.

(7) **TONE OUT**

The CW sidetone may be fed to an external receiver through this jack.

(8) **A TRIP IN**

Anti-trip input from an external receiver may be made via this jack, to prevent the receiver audio output from tripping the FT-101ZD VOX.

(9) **KEY**

The CW key may be connected at this point. Key-up voltage is 7 volts, and key-down current is 1.5 mA. Be sure your electronic keyer's output switch will handle these levels.

(10) **EXT VFO**

Connection of an external VFO, such as the FV-901DM, can be made at this jack.

(11) **FUSE**

This is the fuse holder. For 100 - 117 volts, replace with only a 5 amp use. For 200 - 234 volts, use a 3 amp fuse. Replace fuses only with a fuse of the proper rating.

(12) **IF OUT**

Wideband IF output is available at this jack for use with a spectrum analyzer, etc.

(13) POWER

Connect the AC power cord at this point, being certain that your AC supply voltage matches the voltage specification for your transceiver. See the transformer primary connection chart. When using the optional DC-DC converter, the DC supply is connected at this point. DO NOT CONNECT THE AC POWER CORD TO A DC POWER SOURCE. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY SUCH IMPROPER POWER CONNECTIONS.

(14) TONE

This control varies the CW sidetone output level.

(15) A TRIP

This control varies the level of the VOX anti-trip circuit.

(16) PTT

External control of the transceiver PTT (push to talk) system may be made at this jack, for use with a footswitch, etc.

(17) PATCH

Microphone or phone patch input may be made at this jack. Impedance is 500 ohms.

(18) EXT SP

This is a miniature phone jack for speaker output. When a plug is inserted into this jack, the transceiver internal speaker will be cut off. Impedance is 4 - 16 ohms.

(19) DC-DC CONVERTER (OPTION)

The optional DC-DC converter allows operation from a 13.5 volt DC power source.

(20) COOLING FAN (OPTION)

The optional cooling fan keeps the tubes at a safe operating temperature, when they are used in a hot environment. The 2 pin fan power jack supplies 100 volts to the fan.



## ACCESSORIES

The following accessories are included with your new transceiver:

(1) AC POWER CORD 1

The power cord comes equipped with a 6-prong connector for connection to the AC supply.

(2) ACC PLUG 1

The accessory plug allows access to relay contacts and transceiver operating voltages. The ACC plug must be inserted in the accessory socket for proper operation of the transceiver, whether or not external connections are being made.

(3) PHONO PLUG 2

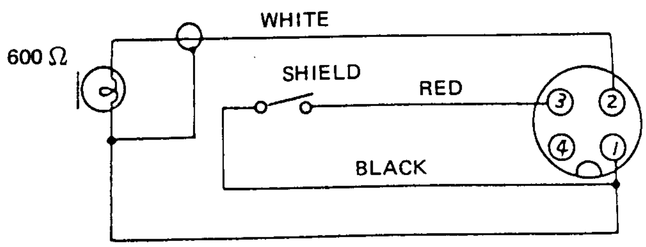
Use these plugs for interface with station equipment via the FT-101ZD rear panel.

(4) SPARE FUSES 5A (3A) 1 each

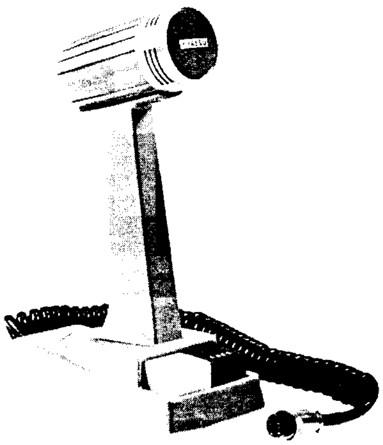
When replacing fuses, be absolutely certain to use a fuse of the proper rating. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY IMPROPER FUSE REPLACEMENT. For 100 - 117 volt AC operation, use a 5 amp fuse. For 200 - 234 volt operation, use a 3 amp fuse.

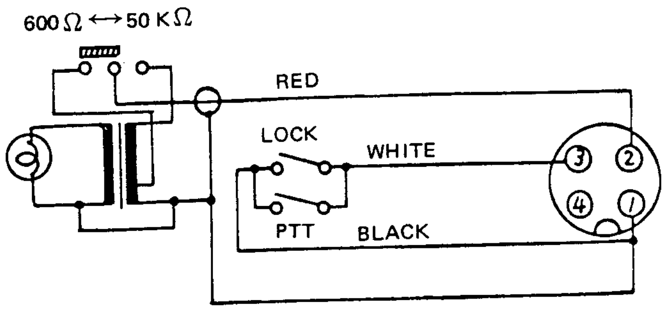
# MICROPHONE CONNECTIONS



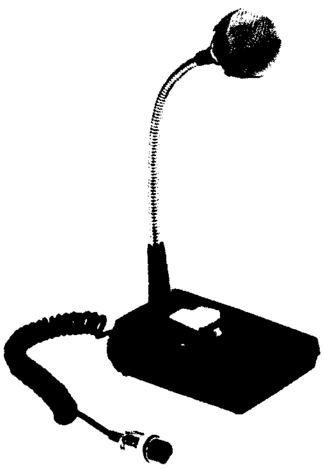


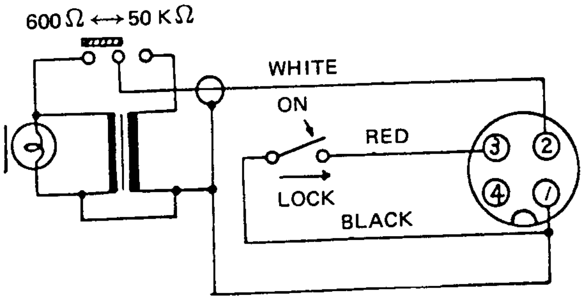

YE-7A





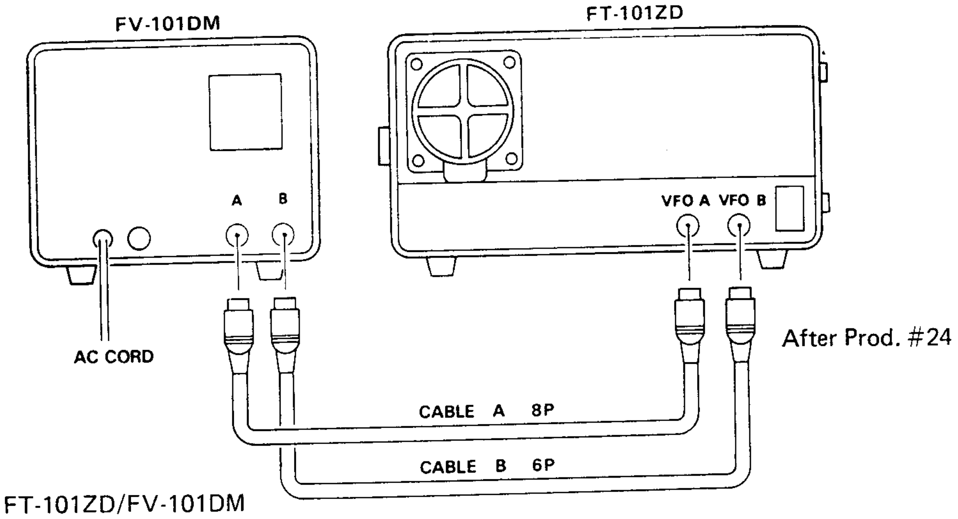

YD-844A



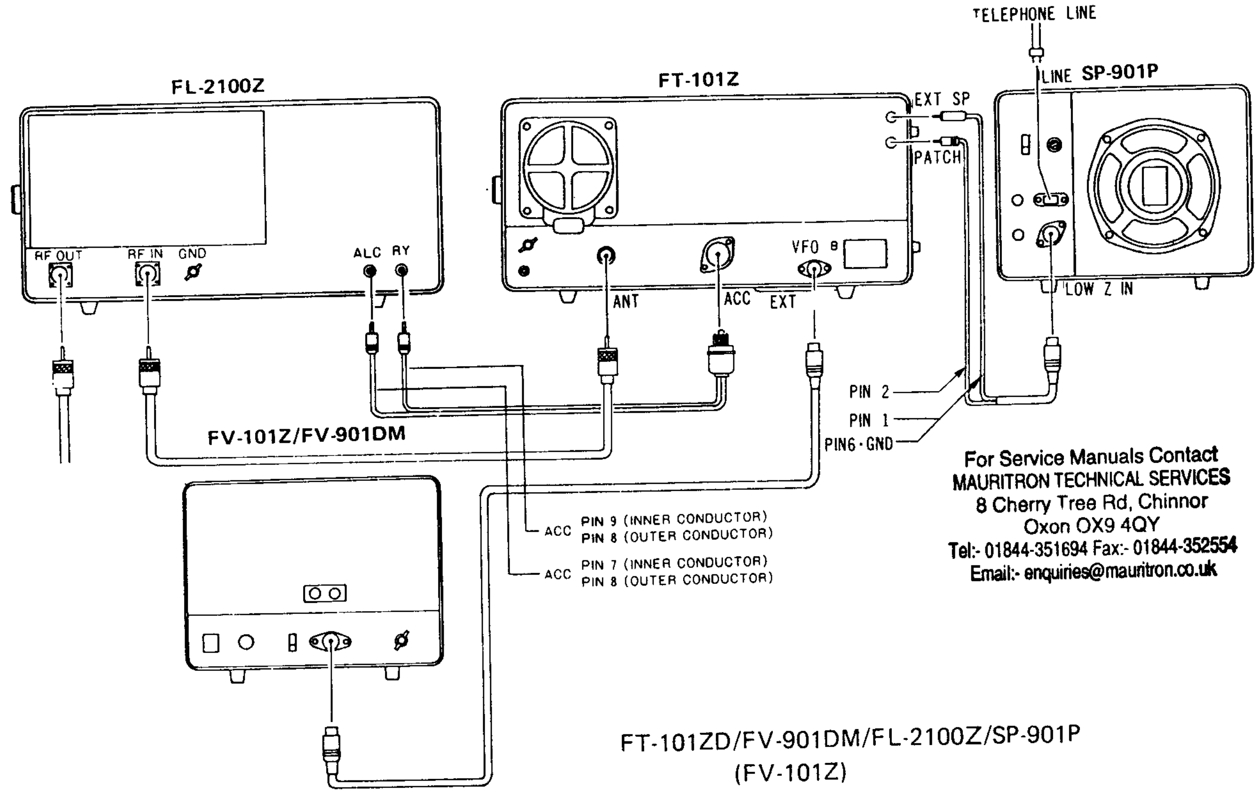



YD-148

# INTERCONNECTIONS

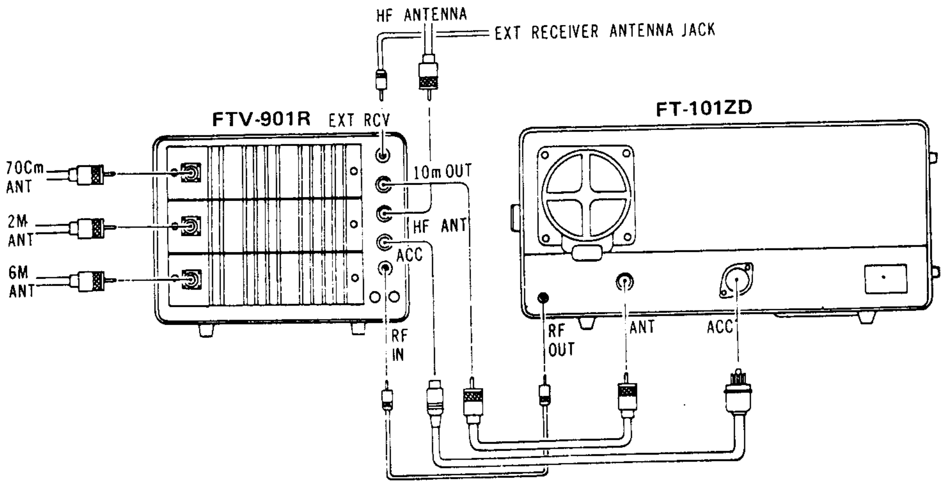



FT-101ZD/FV-101DM

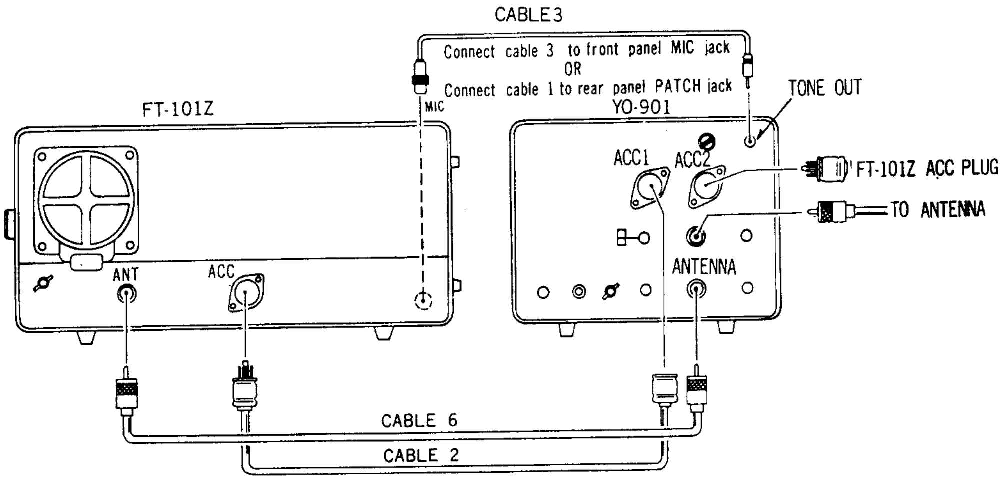




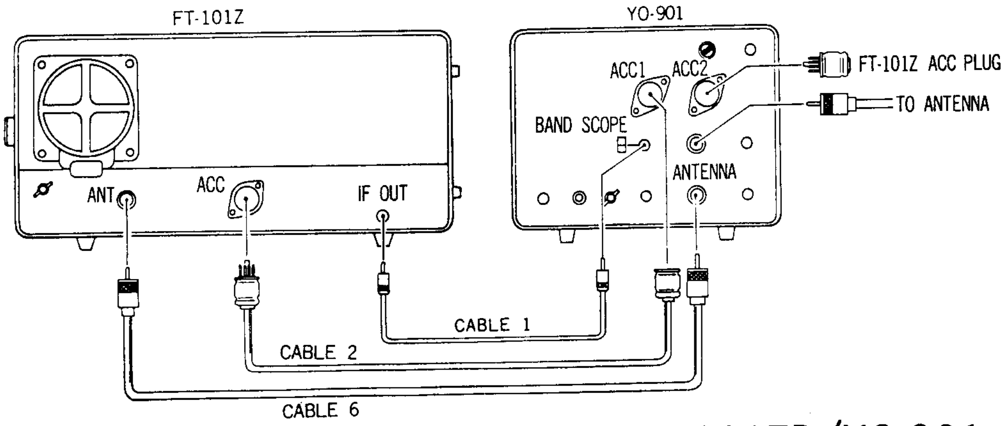

FT-101ZD/FV-901DM/FL-2100Z/SP-901P
(FV-101Z)



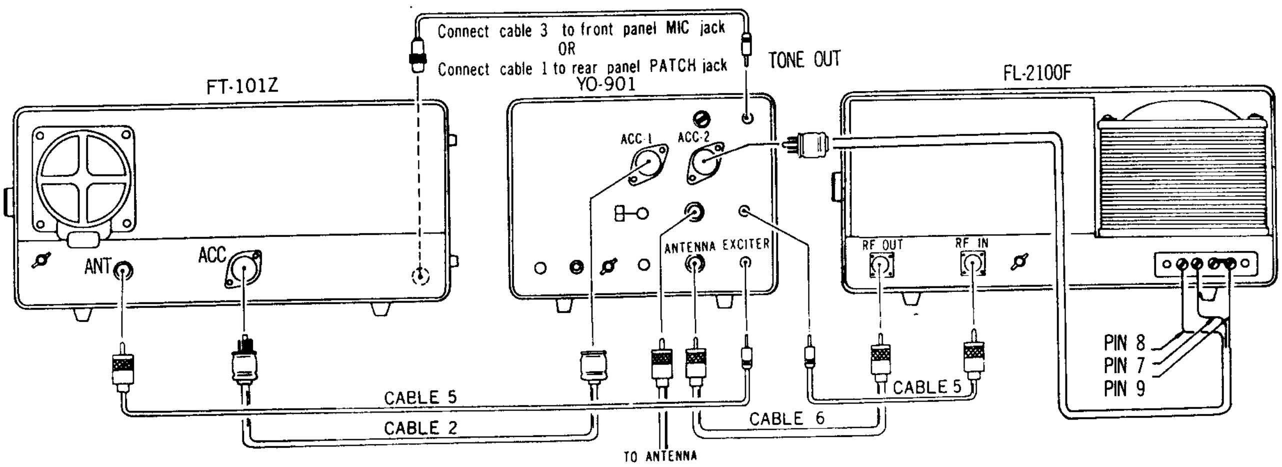

FT-101ZD/FTV-901R




FT-101ZD/YO-901
(monitorscope mode)




FT-101ZD/YO-901
(Band scope mode)




FT-101ZD/YO-901/FL-2100F

# INSTALLATION

The FT-101ZD is designed to be a single-unit station for fixed or portable operation from AC power. Power supply connections providing for operation from a variety of source voltages are available. Please read the following sections carefully, so as to ensure proper installation of your new transceiver.

## PRELIMINARY INSPECTION

Upon opening the packing carton, immediately give the transceiver a thorough visual inspection. Check to see that all controls and switches are working freely, and inspect the cabinet for any signs of damage. If any damage has been sustained, immediately contact the shipping company, and document the damage completely. Save the packing carton and foam packing material for possible use at a later date.

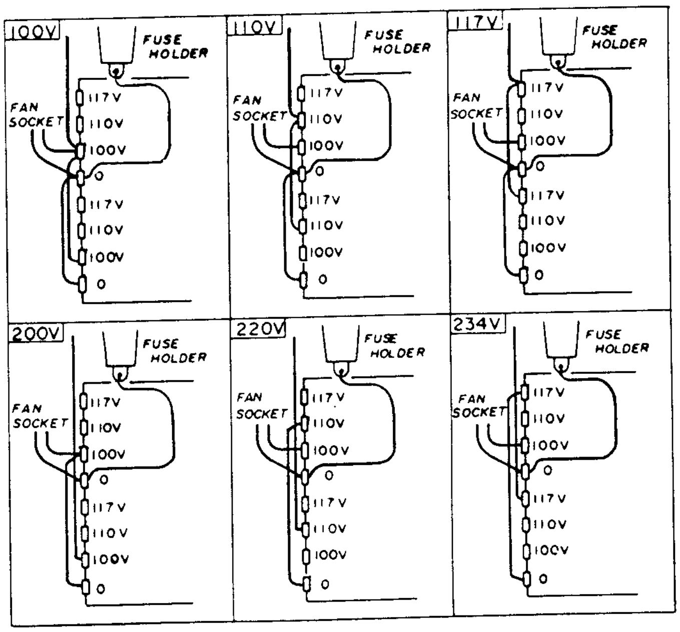


## BASE STATION INSTALLATION

The FT-101ZD is designed for use in many areas of the world, using supply voltages that may differ from your local supply voltage. For this reason, be absolutely certain that the voltage specification marked on the rear of the transceiver agrees with the local AC supply voltage. THIS INSPECTION MUST BE MADE BEFORE CONNECTING THE AC POWER CORD TO THE REAR APRON OF THE TRANSCEIVER.

**CAUTION**

PERMANENT DAMAGE WILL RESULT IF IMPROPER AC SUPPLY VOLTAGE IS APPLIED TO THE TRANSCEIVER. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY APPLICATION OF IMPROPER SUPPLY VOLTAGE. DO NOT CONNECT THE AC POWER CORD TO A DC POWER SOURCE.



The transceiver should be connected to a good earth ground. The ground lead should be made of a heavy, braided wire, and should be connected to the GND terminal on the rear apron of the transceiver.

## MOBILE INSTALLATION

(Note: The DC-DC converter described herein is optional equipment. See your Yaesu dealer.)

When the optional DC-DC converter is installed, the FT-101ZD will operate satisfactorily from a 13.5 volt DC power source capable of providing the required current. The DC power cord is included with the DC-DC converter kit.

For under-dash mobile mounting, a special mobile mounting bracket is an available option for your transceiver. The FT-101ZD should be located away from heater ducts, and a minimum of two inches of air space on all sides is recommended, to allow proper air flow around the cabinet. Never stack other units above or below the FT-101ZD, as the accumulated heat from both units could cause damage.

The transceiver requires an average of 14 amps on transmit, with 20 amps on voice peaks. The DC power cable comes equipped with a 20 amp fuse. Be certain to use only a 20 amp fuse when making replacements.

When making battery connections, be absolutely certain that the RED lead is connected to the POSITIVE battery terminal, and the BLACK lead is connected to the NEGATIVE battery terminal. Reversed connections could cause permanent damage to the transceiver. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY IMPROPER SUPPLY CONNECTIONS.

It is recommended that the power connections be made directly to the battery, instead of to the ignition switch, etc. The battery provides considerable filtering action against ignition noise, and connection to the ignition switch can place the power line in a noisy circuit. Keep the power lead as short as possible, and keep the lead away from ignition cables.

Before connecting the DC power cable to the transceiver, check the battery voltage with the engine running (battery charging). If the voltage exceeds 15 volts DC, the vehicle voltage regulator should be adjusted, so as to limit the highest charging rate to less than 15 volts. As well, do not operate the transceiver if the DC supply voltage is less than 12 volts. The transceiver should always be turned off when the car is started, to prevent voltage transients from damaging the power supply components.

## ANTENNA CONSIDERATIONS

The FT-101ZD is designed for use with an antenna system presenting a 50 - 75 ohm resistive load at the antenna jack. While the transmitter output circuitry is designed for uniform response within this impedance range, significant departures from the 50 - 75 ohm specification will result in seriously degraded transceiver performance, and may result in damage to the final amplifier tubes.

If an open-wire feedline is used, or if the input impedance of the antenna system presents a higher or lower impedance than specified, some sort of antenna tuner must be used to provide the proper impedance for the transceiver. See your Yaesu dealer for details of the FC-901 antenna coupler.

For mobile operation, most of the commercially-available antennas will provide satisfactory results, if care is taken to tune the antenna for minimum SWR. The outer conductor of the coaxial cable should be securely grounded to the automobile chassis at the antenna mount. See your Yaesu dealer for details on the RSL series of mobile antennas.

# OPERATION

The tuning procedure for this transceiver is not complicated. However, care should be exercised when tuning so that peak performance of the equipment is secured. The following paragraphs describe the procedure for receiver and transmitter tuning.

## INITIAL CHECK

Before connecting the transceiver to the power source, be certain that the voltage specification marked on the rear of the transceiver matches your local supply voltage, and also confirm that a fuse of the proper rating is being used.

## FREQUENCY SELECTION

Frequency readout on the FT-101ZD is by digital as well as analog displays. The FT-101Z uses analog display only. The analog readout dial provides resolution to 1 kHz, while the FT-101ZD digital display provides resolution to 100 Hz. The digital display may be added to the FT-101Z as an option. See your Yaesu dealer for details.

## RECEIVE OPERATION

(1) Preset the controls and switches as follows:

POWER . . . . . OFF
HEATER . . . . OFF
VFO. . . . . . . . Switch pushed
VOX GAIN . . PTT position
RF GAIN . . . . Fully clockwise
AF GAIN . . . Adjust later for comfortable level
BAND . . . . . . Desired band
MODE . . . . . . Desired mode
PRESELECT . Desired band segment
AGC. . . . . . . . OFF
ATT . . . . . . . . OFF
MARK/NB . . . OFF
▲ APF/NOTCH . Fully counterclockwise

(2) Turn the power switch to ON. The meter will light up, and the operating frequency will be displayed on the dial window (FT-101ZD). Adjust the AF GAIN control for a comfortable listening level, and adjust the PRESELECT control for maximum receiver noise or signal level. The PRESELECT control may require repeaking as the transceiver is tuned across the band.

(3) The RX CLARIFIER may be utilized if the received signal is drifting. Push the RX button, and rotate the CLARIFIER control for offset of up to 2.5 kHz. A red LED indicator will light up when the clarifier is in use.

(4) When pulse-type noise is encountered, the NB (Noise Blanker) switch should be activated. Advance the noise blanker level control (located on the front panel) to the point which provides the desired blanking. Do not advance the level control beyond the point required to eliminate the noise pulses.

(5) For varying the width of the IF passband, rotate the WIDTH control. In the IF, two 8-pole crystal filters are used. One filter is fixed, and presents a boundary for the bandwidth. The center frequency is then varied across the passband of the second filter, using a mixing scheme that provides no change of pitch in the received signal.

The result is a continuously variable bandwidth, from 2.4 kHz down to approximately 300 Hz. With the WIDTH control in the "0" position, the second IF filter is instantly aligned with the first filter, returning the receiver to a 2.4 kHz bandwidth.

(6) For extremely strong signals, the ATT (attenuator) switch may be activated, providing 10 dB or 20 dB of attenuation on the incoming signal path, depending on the position of the ATT switch.

▲ (7) Under conditions of very heavy QRM, while operating CW, the APF (Audio Peak Filter) may be activated. Push the APF/NOTCH botton to APF, and tune the APF/NOTCH control for maximum enhancement of the desired signal. The operator will observe that the background noise will be reduced dramatically, resulting in excellent signal to noise ratio.

▲ (8) For elimination of an interfering carrier within the AF passband, set the APF/NOTCH switch to NOTCH. Then rotate the APF/NOTCH control carefully for the best nulling of the offending carrier. The notch is extremely sharp, so tuning is critical, but the excellent notch depth is extremely effective in eliminating interference.

▲ After Prod. #24

## TRANSMITTER TUNING

The following tuning procedure must be performed prior to commencing operation on the desired mode. See the paragraphs relating to the specific mode after basic transmitter tune-up has been accomplished.

Be certain that a dummy load or matched antenna is connected to the antenna receptacle on the rear apron of the transceiver. It is possible to damage the final amplifier components of this equipment if this simple precaution is not followed prior to commencing transmission.

<u>Do not exceed 10 seconds of key-down time while tuning.</u>

As well, be certain that the ACC plug is inserted into the rear apron ACC jack. Without this plug, there will be no power applied to the tube heaters. Heater voltage is applied through pins 1 and 2 of the accessory socket.

(1) Preset the controls and switches as follows:

MODE .......... TUNE
DRIVE ......... Fully counterclockwise
DELAY ......... Fully counterclockwise
MIC GAIN....... Fully counterclockwise
COMP LEVEL ... Fully counterclockwise
HEATER ........ ON
PROC .......... OFF
PO/IC/ALC ...... IC
PLATE ......... Set to desired band segment
LOADING ....... 0
PRESELECT ..... Peaked on receive for maximum response
TX CLARIFIER .. OFF (button not pushed)

(2) Turn the HEATER switch ON, and wait 1 minute for the tube heaters to warm up.

(3) Set the VOX GAIN switch to the MOX position. Observe the reading on the IC meter: it should read 50 mA with no drive applied. If it is not, adjust the PB-1968 BIAS control for a resting current of 50 mA on the IC meter. Refer to the BIAS Adjustment in Page 41. Be certain that the DRIVE control is fully counterclockwise for this adjustment.

(4) Set the VOX GAIN switch to MOX. Advance the DRIVE control for a reading of 150 mA.

(5) Peak the PRESELECT control for a maximum meter reading. If the meter reading exceeds 150 mA, reduce the setting of the DRIVE control.

(6) Rotate the PLATE control for a minimum reading ("dip") on the IC meter. Return the transceiver to the receive mode by rotating the VOX GAIN switch out of the MOX position.

### LOADING POSITIONS

| BAND | FREQUENCY | POSITION |
|---|---|---|
| 160m | 1.8MHz | 2.5 |
| | 2.0MHz | 6.0 |
| 80m | 3.5MHz | 3.0 |
| | 4.0MHz | 6.0 |
| 40m | 7.0MHz | 6.0 |
| | 7.5MHz | 6.5 |
| ▲ 30m | 10.0MHz | 7.0 |
| | 10.5MHz | 7.8 |
| 20m | 14.0MHz | 3.0 |
| | 14.5MHz | 4.0 |
| ▲ 17m | 18.0MHz | 2.0 |
| | 18.5MHz | 2.0 |
| 15m | 21.0MHz | 2.0 |
| | 21.5MHz | 2.5 |
| ▲ 12m | 24.5MHz | 3.0 |
| | 25.0MHz | 3.0 |
| 10m A | 28.0MHz | 2.0 |
| 10m B | 28.5MHz | 2.0 |
| 10m C | 29.0MHz | 2.0 |
| 10m D | 29.5MHz | 2.0 |

▲ After Prod. #17

NOTE: LOADING positions are nominal. Minor variations from positions shown are to be expected.

## FINAL TUNING

Final transmitter tuning uses the relative power output setting of the METER switch. At full rated output, using a 50 ohm load, the PO meter will indicate between 1/2 and 2/3 of full scale deflection. If the PO reading is too high (off scale) or too low (1/4 scale or less), and if the load impedance is very close to 50 ohms, the PO ADJ control on the rear apron may be varied to provide the proper deflection. Once the PO meter is calibrated, off-scale deflections are the result of reflected power (high SWR), and corrective action may be required in the antenna system.

Set the controls as follows for final tuning:

(1) Set the METER switch to PO. Rotate the DRIVE control to the 9 o'clock position.

(2) Rotate the VOX GAIN control to the MOX position, and rotate the PRESELECT control for a maximum meter reading.

(3) Rotate the LOADING control for a maximum meter reading. Rotate the PLATE control for a maximum meter reading.

(4) Again rotate the LOADING control and PLATE control, each time advancing the DRIVE control approximately 2 steps, until the DRIVE control is fully clockwise. The transmitter is now tuned for maximum power output. Do not exceed the maximum tuning time stipulated previously. Return the VOX GAIN switch to the VOX position (out of the MOX position), return the METER switch to IC, and return the DRIVE control to the fully counterclockwise position.

## SSB OPERATION

After completing the above tuning procedure, set the MODE switch to USB or LSB as desired. Set the VOX GAIN control to PTT, and activate the transmitter by pushing the microphone PTT switch or the footswitch, if used. With the METER switch set to the ALC position, speak into the microphone in a normal voice. Advance the MIC GAIN control until the meter kicks up to the midscale of the green-colored portion of the meter scale.

Note: When the METER switch is set to IC, voice modulation peaks will indicate 150 - 200 mA. Actual peak current, though, is approximately 2 times the indicated value.

To set the sensitivity of the VOX (voice-operated T/R switching) system, advance the VOX GAIN control slowly while speaking into the microphone. Advance the VOX GAIN control to the point where the speech signal activates the transmitter.

Set the antitrip potentiometer on the rear apron to the minimum point which prevents the speaker output from tripping the VOX. Do not use more VOX gain nor antitrip than is necessary. Adjust the front panel DELAY control for the desired relay recovery time.

## RF SPEECH PROCESSOR ADJUSTMENT

The FT-101ZD RF speech processor, when correctly adjusted, will improve the intelligibility threshold at the receiving end, by increasing the average SSB power output. RF clipping is applied to the IF signal, which is then filtered to remove harmonics and out of band intermodulation products. RF envelope clipping causes much less distortion than that caused by an equivalent amount of AF clipping, and the result is an output signal with more "punch".

Set the PROC switch to OFF, and set the MIC GAIN control as described previously (voice peaks falling within the green zone of the ALC meter scale). Now set the PROC switch to ON, and set the COMP LEVEL control to the 10 o'clock position. Advance the DRIVE control so that the desired power output is obtained, and be sure that the ALC meter indication is within the green zone.

With the RF speech processor activated, the ALC meter indication may not be quite as high as when the processor is off. This is entirely normal, because the average power output is higher with the processor, although the **peaks** are being clipped.

Setting the COMP LEVEL control up to the 3 o'clock position will provide up to 10 dB of compression. Advancing the control beyond the 10 o'clock point may, however, degrade the voice-to-noise ratio, so caution is recommended.

## CW OPERATION

After completing the tuning procedure, insert the key line into the KEY jack on the rear panel.

The operator may select any power output desired by advancing the DRIVE control. Once the maximum power output level has been reached, the DRIVE control should not be advanced further.

The transmitter may be activated by the VOX circuit, or by the PTT or MOX systems. The TONE control on the rear apron of the transceiver sets the CW sidetone level.

The key-up voltage at the key jack is 7 volts, and the key-down current is 1.5 mA.

For receiving, two positions of selectivity are provided. When the optional CW filter is installed, the operator may select between the 600 Hz bandwidth of the CW filter and the 2.4 kHz bandwidth of the SSB filter. The WIDTH control may be used with either position of the MODE switch: CW-W or CW-N.

## AM OPERATION (with optional AM unit) (After Prod. #8)

AM operation of the transmitter is accomplished by setting the MODE switch to the AM/FM position and inserting the proper amount of carrier with the DRIVE control.

After completing basic transmitter tune-up, place the MODE switch in the AM/FM position. Activate the transmitter, and rotate the DRIVE control until the meter reads .10 (100 mA) in the IC position of the METER switch. While speaking into the microphone in a normal voice, increase the MIC GAIN control until the meter indicates very slight movement with voice peaks. Care must be exercised that the DRIVE control is not advanced too far. Do not exceed .10 (100 mA) meter indication during AM operation or damage to the transmitter final amplifier tubes may result.

## FM OPERATION (with optional FM unit) (After Prod. #24)

After completing the basic transmitter tune-up, set the CARR control for 100 mA carrier level with the MODE switch in the AM/FM position.
Speak into the microphone in a normal voice. The MIC GAIN and COMP LEVEL controls have no effect on the FM mode.

For FM reception, the SQL control on the front panel should be advanced only as far as required to silence background noise. When adjusted just past the silencing threshold, the squelch circuitry will provide noise-free reception with maximum sensitivity to weak FM signals.

Note: Either AM unit or FM unit can be installed in your FT-101ZD.



## SELECT SWITCHES

The SELECT switches allow selection of internal or external VFO frequency control, as well as selection of up to 2 optional crystal-controlled channels.

When the crystal-controlled channels are installed, they may be selected by pressing CH1 or CH2, as desired. See the crystal information elsewhere for full information on crystal requirements.

The external VFO, FV-101Z, FV-101DM and FV-901DM, which provide versatile operations with your FT-101ZD, are available from your Yaesu dealer.
Because there is no calibrated dial for the FV-901DM, it can't be used with the analog FT-101Z.

For transceive frequency control on the external VFO, press EXT. For external VFO control of the transmit frequency, with receive frequency control on the FT-101ZD, press TX EXT. For receive frequency control on the external VFO, and transmit frequency control on the FT-101ZD, press RX EXT. For full transceive control on the FT-101ZD, press VFO.

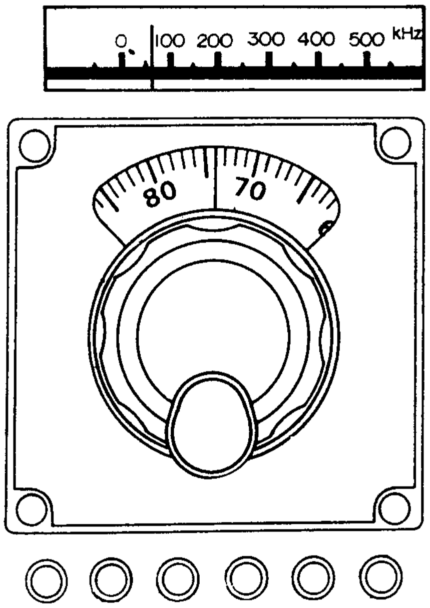
## DIAL CALIBRATION AND FREQUENCY DETERMINATION

The FT-101ZD mixing scheme accounts for the difference in carrier frequencies between USB and LSB. For this reason, no recalibration is required. Once the calibration is properly aligned (at the factory, or in shop), no further adjustment is required for accurate frequency derivation. The 25 kHz calibrator is included largely for alignment purposes, as it provides a useful reference signal for signal peaking, etc.

Frequency readout on the FT-101ZD digital display is straightforward. The full operating frequency is displayed, with resolution to 100 Hz.

The analog display on the FT-101Z and FT-101ZD transceivers provides easy determination of the operating frequency. The frequency displayed on the analog sub dial (and the main display window, for the FT-101Z) is added to the lower band edge frequency.

For example, if the analog dial indicates 074, as shown in the example, and the BAND switch is on 40 meters (lower band edge: 7000 kHz), the operating frequency will be 7074 kHz. By rotating the BAND switch, this position of the analog display will produce 14074 kHz for 20 meters, 21074 for 15 meters, etc. For 80 and 12meters,the lower band edges are 3500 kHz and 24500 kHz while for 160 meters the band edge is 1.5 MHz. Therefore, the dial should read 074 to produce 3574 kHz, but 374 for 1874kHz. Be careful so as not to operate outside the amateur bands.




## FIXED CHANNEL CRYSTAL INFORMATION

Two fixed channels may be used with your FT-101ZD, using optional crystals. Crystals are available from your Yaesu dealer. Crystals must meet the specifications shown in Table 2 , and must fall within the operating range 5500 - 5000 kHz. Frequency calculation is made from the formula

$$F_X = F_1 - F_0$$

where $F_X$ is the crystal frequency
$F_1$ is a constant derived from Table 1
$F_0$ is the operating frequency.

For example, let us say it is desired to operate on 7199 kHz LSB. Referring to Table 1, we see that for 40 meter LSB, $F_1$ is 12501.5 kHz. Subtracting $F_0$ (7199 kHz) from $F_1$ (12501.5 kHz) yields 5302.5 kHz, the crystal frequency ($F_X$).

For operation on 21420 kHz USB, compute the crystal frequency as follows:
$F_X$ = 26498.5 – 21420 = 5078.5 kHz.

Inspection of the values of $F_1$ in Table 1 will reveal that the 7199 kHz crystal for LSB will work on 14199 kHz, 21199 kHz, etc. Of course, LSB is not normally used on these bands. If the operator switches to USB, the operating frequency will be moved ''' kHz (in this case, to 14196 kHz, 21196 kHz, etc.). If the move is made from LSB to CW, the frequency will move 2.3 kHz down.

| BAND \ MODE | USB | LSB | CW/AM,FM |
|---|---|---|---|
| 160m | 6998.5 | 7001.5 | 6999.2 |
| 80m | 8998.5 | 9001.5 | 8999.2 |
| 40m | 12498.5 | 12501.5 | 12499.2 |
| ▲ 30m | 15498.5 | 15501.5 | 15499.2 |
| 20m | 19498.5 | 19501.5 | 19499.2 |
| ▲ 17m | 23498.5 | 23501.5 | 23499.2 |
| 15m | 26498.5 | 26501.5 | 26499.2 |
| ▲ 12m | 29998.5 | 30001.5 | 29999.2 |
| 10m A | 33498.5 | 33501.5 | 33499.2 |
| 10m B | 33998.5 | 34001.5 | 33999.2 |
| 10m C | 34498.5 | 34501.5 | 34499.2 |
| 10m D | 34998.5 | 35001.5 | 34999.2 |

**Table 1**

(▲ After Prod. #17)

| | |
|---|---|
| Type | HC-25/U |
| Load Capacitance | 30pF |
| Series Resistance | 25 Ohms or less |
| Static Capacitance | 7pF or less |
| Drive Level | 5mW |

**Table 2**

# SECTION 2 – TECHNICAL NOTES

# PART DESIGNATIONS ON CIRCUIT BOARDS

## FT-101Z CIRCUIT BOARDS

The FT-101Z series integrates the "mother board" concept and the "plug-in" type of circuit card. Each circuit board used in the FT-101Z has a code number assigned to it, and each part within the transceiver has a part number assigned to it (e.g. $Q_{502}$).

Parts numbers 01–99 (e.g. $R_{12}$) are located on the main chassis. Other parts, located on the circuit boards, are assigned a three or four digit part number; the last two digits are the part number for that particular board, while the first one or two digits are the code number for the board.

Thus, $Q_{301}$ is transistor number 01, located on circuit board number 3, which is the PREMIX UNIT. Refer to the accompanying chart for a tabulation of the code numbers assigned to the various circuit boards used in the FT-101Z series.

| Code # | Unit | Board Designation |
|---|---|---|
| 1 | RF | PB-1960A (PB-2154) |
| 2 | NB/FIX | PB-1961B |
| 3 | PREMIX | PB-1962A (PB-2152) |
| 4 | IF | PB-1963B |
| 5 | AF | PB-1964A |
| 6 | PREMIX LOCAL | PB-1965 (PB-2153) |
| 7 | SELECT SW. | PB-1966C |
| 8 | VFO | PB-1440B-3420 |
| 9 | RECT A | PB-1967 |
| 10 | RECT B | PB-1968A |
| 11 | CAPACITOR | PB-1969A |
| 12 | TRIMMER A | PB-1970 (PB-2193B) |
| 13 | TRIMMER B | PB-1970 (PB-2192B) |
| 14 | TRIMMER C | PB-1092 |
| 15 | BW CONT (APF) | PB-1972 (PB-2217) |
| 16 | DRIVER | PB-1714A |
| 17 | FINAL | PB-1715A |
| 18 | CLAR CONT | PB-1973A |
| 19 | LED | PB-1974A |
| 20 | LEVER SW | PB-1975A |
| 21 | DISPLAY | PB-1978 (PB-2098A) |
| 22 | COUNT/DECODE | PB-1979 |
| 23 | COUNTER MAIN | PB-1980 (PB-2086A) |
| 24 | AM | PB-2040 |
| 25 | FM | – (PB-2218) |
| 32 | DC-DC CONV | – |

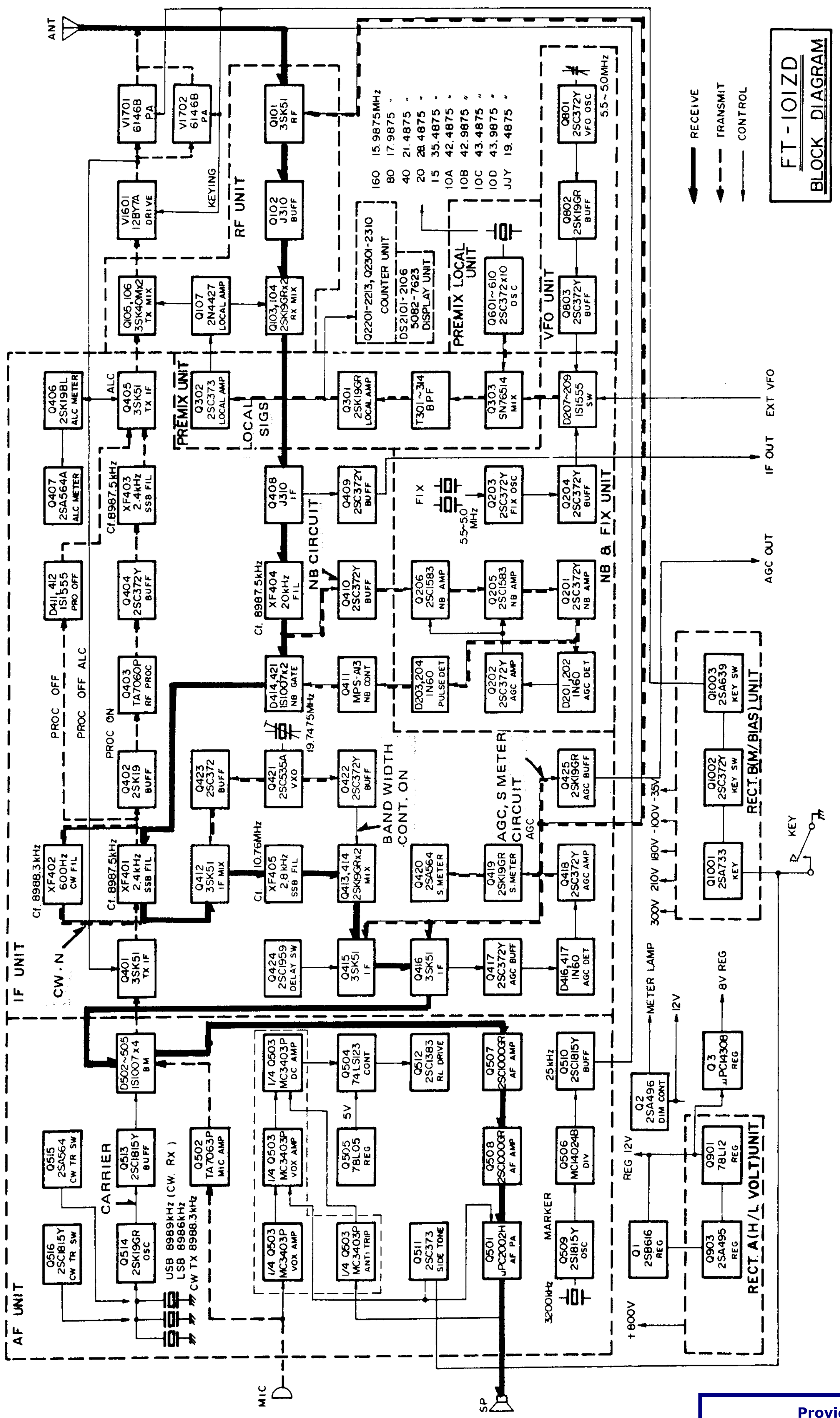


## SIGNAL TRACING IN THE FT-101ZD

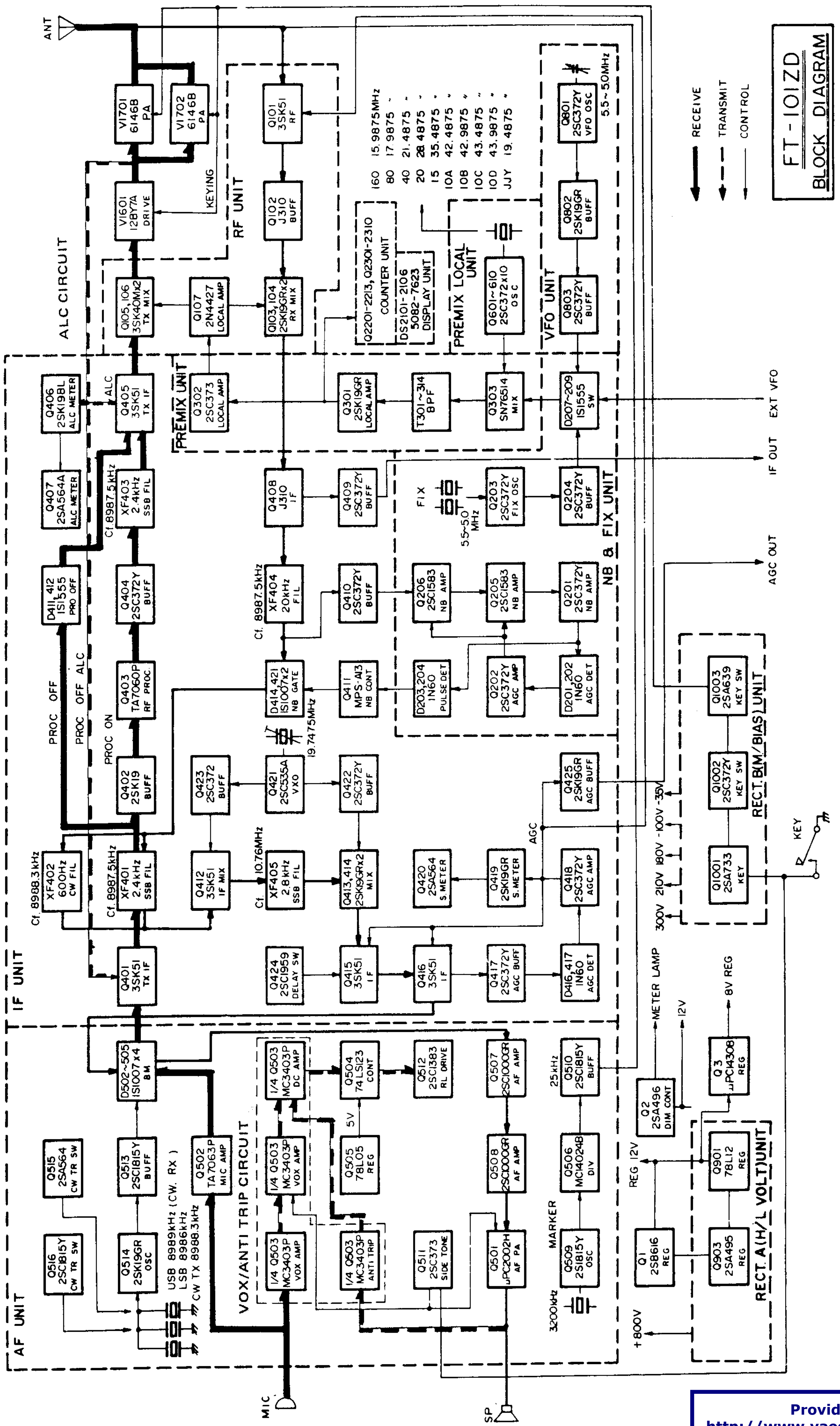
A highly useful signal in the FT-101ZD, one that can be used for most receiver alignment steps, is the internal calibrator. Fed into the receive line right at the antenna terminal, the calibrator signal should read about S9 + 10 dB, with the preselector peaked, at 14.200 MHz, SSB mode. While minor variations from this figure are no cause for alarm, a blown RF amplifier FET will cause this reading to be practically nil.

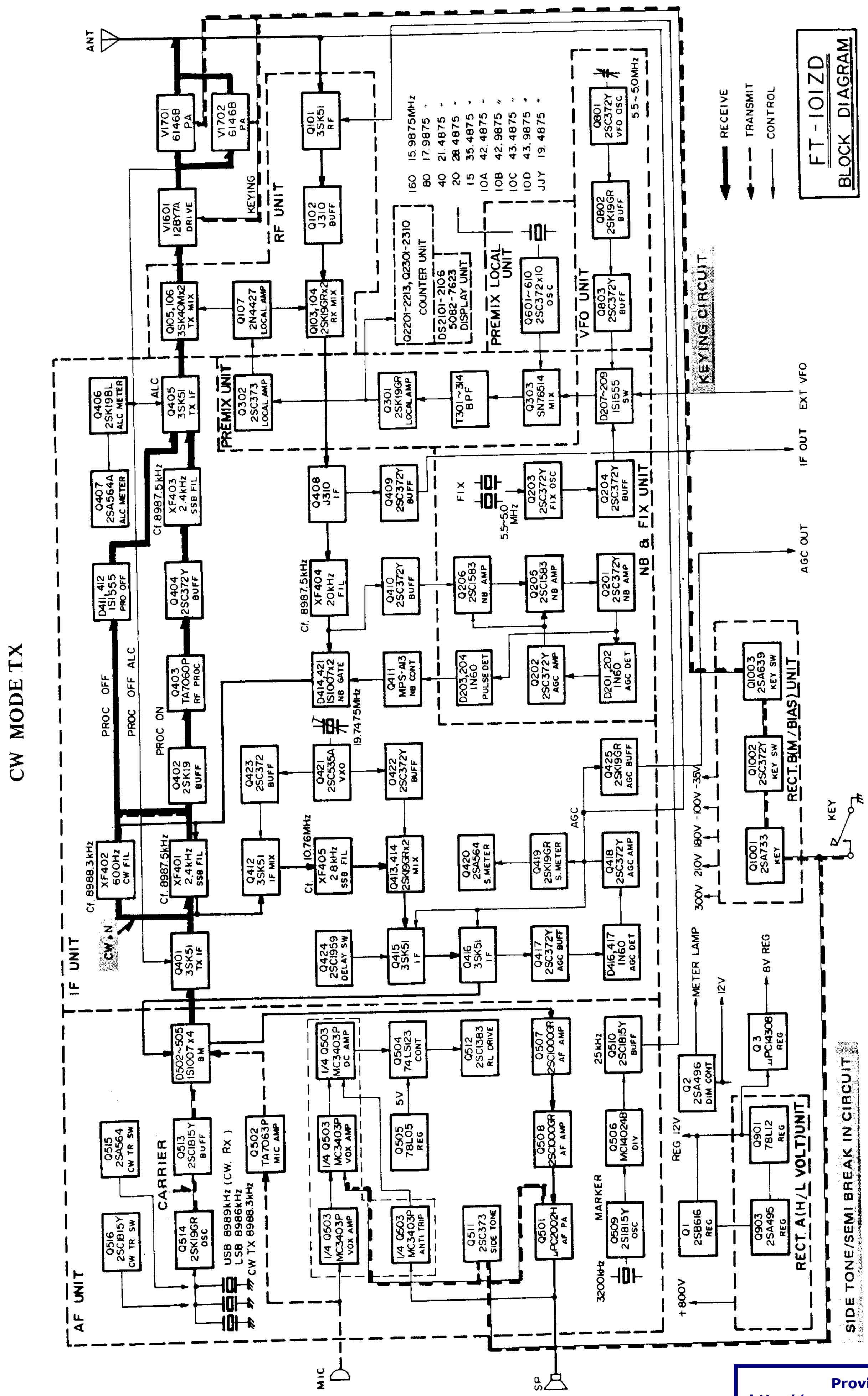
In the following section, we have presented augmented block diagrams which should help you in tracing the signal paths throughout the FT-101ZD. Armed with a couple of alignment wands and the calibrator signal, receiver peaking can be completed in short order, leaving you free to diagnose problems on the TX side.

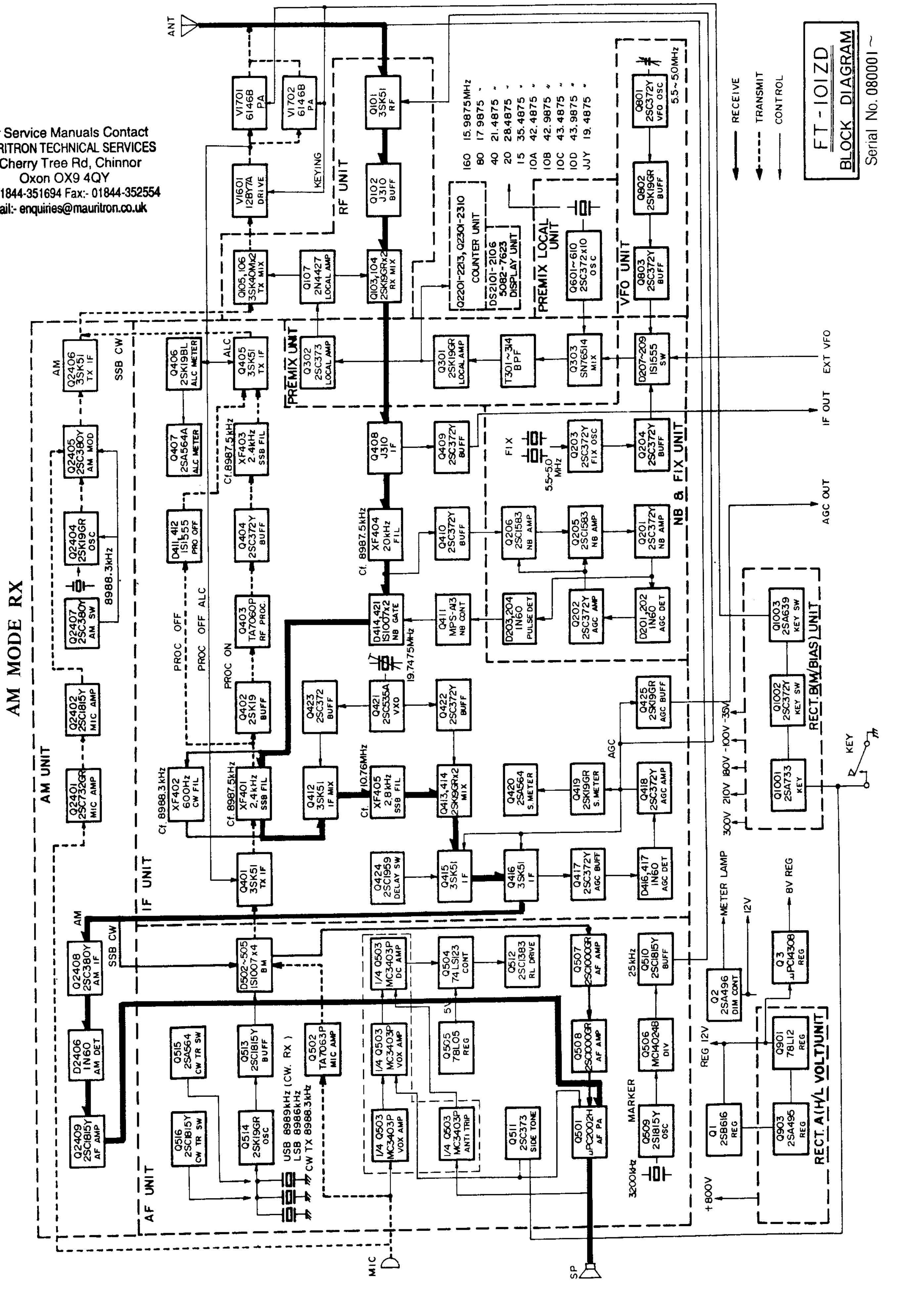
SSB/CW MODE RX

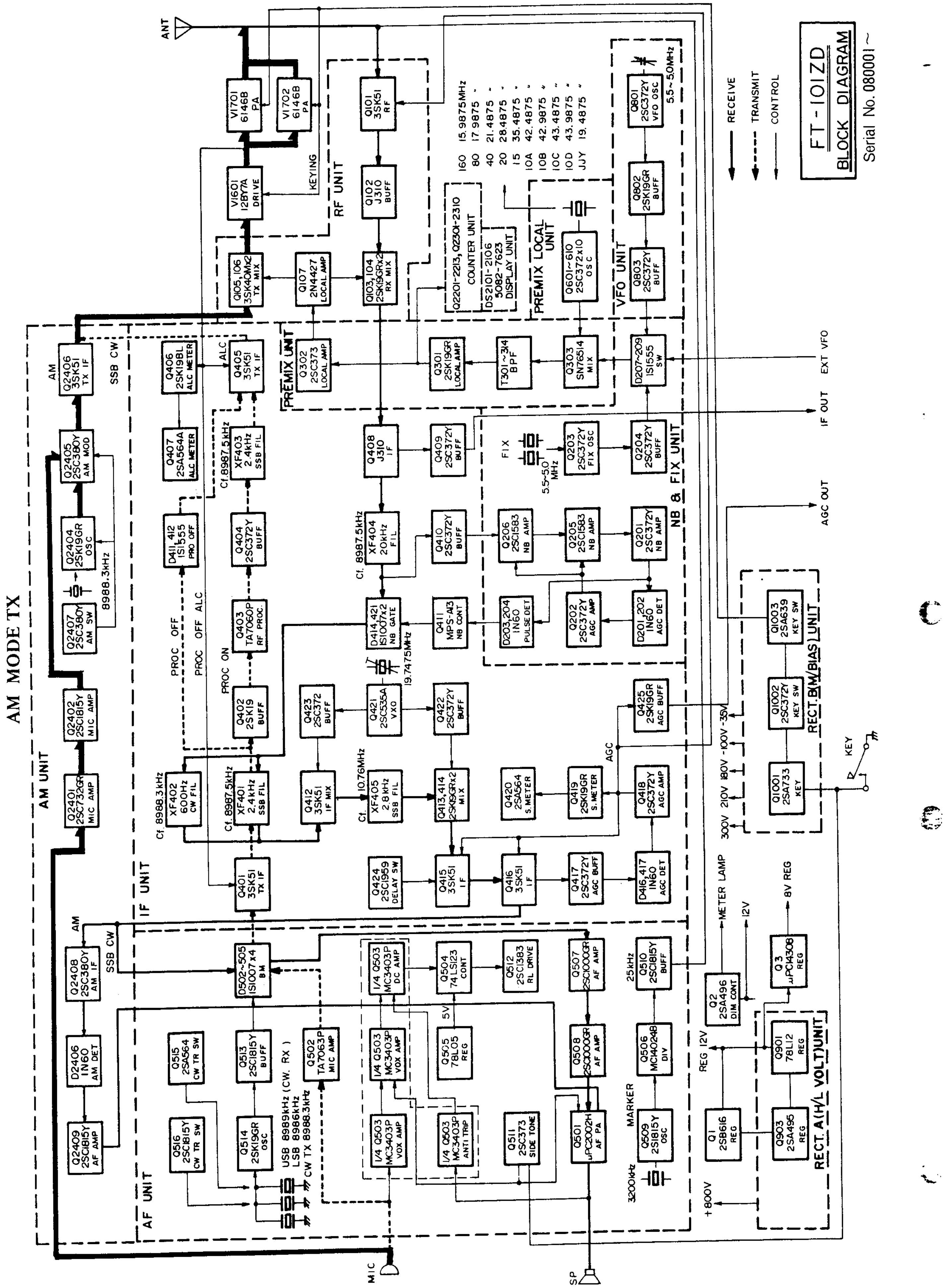


SSB MODE TX

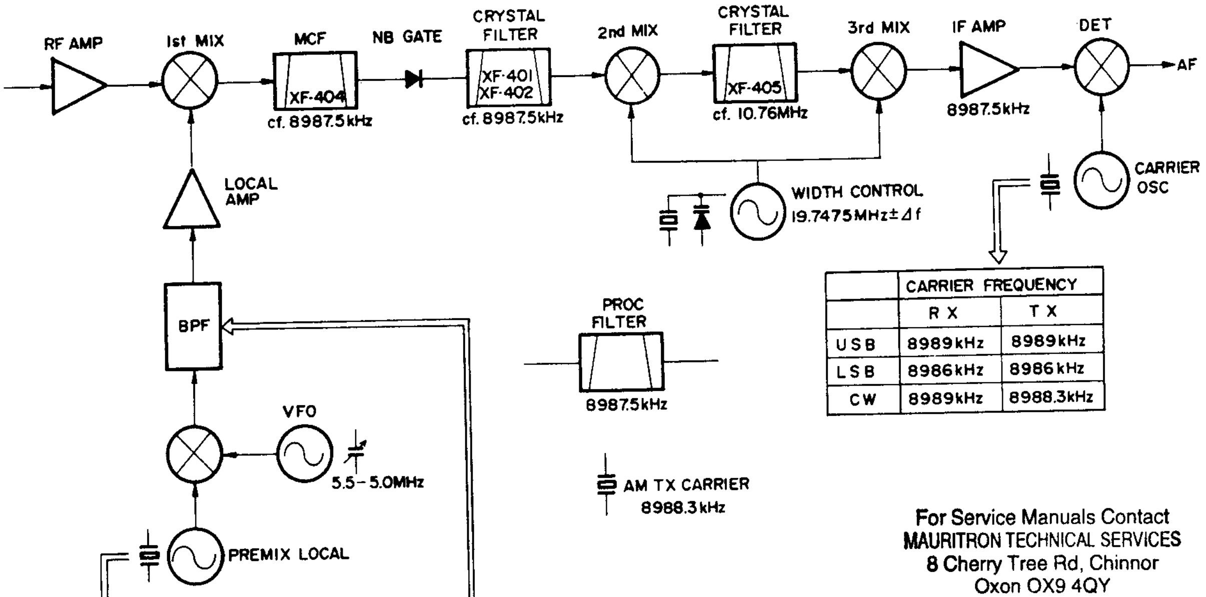

FT-101ZD
BLOCK DIAGRAM
RECEIVE
TRANSMIT
CONTROL
ANT
V1701 6146B PA
V1702 6146B PA
V1601 12BY7A DRIVE
KEYING
RF UNIT
Q101 3SK51 RF
Q102 J310 BUFF
Q103,104 2SK19GRx2 RX MIX
Q105,106 3SK40Mx2 TX MIX
Q107 2N4427 LOCAL AMP
ALC CIRCUIT
160 15.9875MHz
80 17.9875
40 21.4875
20 28.4875
15 35.4875
10A 42.4875
10B 42.9875
10C 43.4875
10D 43.9875
JJY 19.4875
Q2201-2213, Q2301-2310 COUNTER UNIT
DS2101-2106 5082-7623 DISPLAY UNIT
PREMIX LOCAL UNIT
Q601~610 2SC372x10 OSC
VFO UNIT
Q801 2SC372Y VFO OSC
Q802 2SK19GR BUFF
Q803 2SC372Y BUFF
5.5~5.0MHz
PREMIX UNIT
Q302 2SC373 LOCAL AMP
Q301 2SK19GR LOCAL AMP
T301~314 BPF
Q303 SN76514 MIX
D207~209 1S1555 SW
EXT VFO
IF OUT
AGC OUT
Q406 2SK19BL ALC METER
Q405 3SK51 TX IF
ALC
Q407 2SA564A ALC METER
XF403 2.4kHz SSB FIL
Cf. 8987.5kHz
Q408 J310 IF
Q409 2SC372Y BUFF
FIX
5.5~5.0 MHz
Q203 2SC372Y FIX OSC
Q204 2SC372Y BUFF
NB & FIX UNIT
D411,412 1S1555 PRO OFF
Q404 2SC372Y BUFF
Cf. 8987.5kHz
XF404 20kHz FIL
Q410 2SC372Y BUFF
Q206 2SC1583 NB AMP
Q205 2SC1583 NB AMP
Q201 2SC372Y NB AMP
PROC OFF
PROC OFF ALC
PROC ON
Q403 TA7060P RF PROC
D414,421 1S1007x2 NB GATE
19.7475MHz
Q411 MPS-A13 NB CONT
D203,204 1N60 PULSE DET
Q202 2SC372Y AGC AMP
D201,202 1N60 AGC DET
Q1003 2SA639 KEY SW
Q402 2SK19 BUFF
Q423 2SC372 BUFF
Q421 2SC535A VXO
Q422 2SC372Y BUFF
Q425 2SK19GR AGC BUFF
Q1002 2SC372Y KEY SW
RECT. B(M/BIAS) UNIT
Cf. 8988.3kHz
XF402 600Hz CW FIL
Cf. 8987.5kHz
XF401 2.4kHz SSB FIL
Q412 3SK51 IF MIX
Cf. 10.76MHz
XF405 2.8kHz SSB FIL
Q413,414 2SK19GRx2 MIX
Q420 2SA564 S.METER
Q419 2SK19GR S.METER
AGC
Q418 2SC372Y AGC AMP
300V 210V 180V -100V -35V
Q1001 2SA733 KEY
KEY
IF UNIT
Q401 3SK51 TX IF
Q424 2SC1959 DELAY SW
Q415 3SK51 IF
Q416 3SK51 IF
Q417 2SC372Y AGC BUFF
D416,417 1N60 AGC DET
METER LAMP
12V
8V REG
D502~505 1S1007x4 BM
Q503 1/4 MC3403P DC AMP
Q504 74LS123 CONT
Q512 2SC1383 RL DRIVE
Q507 2SC1000GR AF AMP
25kHz
Q510 2SC1815Y BUFF
Q2 2SA496 DIM CONT
Q3 μPC14308 REG
Q515 2SA564 CW TR SW
Q513 2SC1815Y BUFF
Q502 TA7063P MIC AMP
Q503 1/4 MC3403P VOX AMP
5V
Q505 78L05 REG
Q508 2SC1000GR AF AMP
Q506 MC14024B DIV
REG 12V
Q901 78L12 REG
RECT. A(H/L VOLT)UNIT
Q516 2SC1815Y CW TR SW
Q514 2SK19GR OSC
USB 8989kHz (CW. RX)
LSB 8986kHz
CW TX 8988.3kHz
VOX/ANTI TRIP CIRCUIT
Q503 1/4 MC3403P VOX AMP
Q503 1/4 MC3403P ANTI TRIP
Q511 2SC373 SIDE TONE
Q501 μPC2002H AF PA
MARKER
Q509 2SC1815Y OSC
3200kHz
Q1 2SB616 REG
Q903 2SA495 REG
+800V
AF UNIT
MIC
SP


CW MODE TX
FT-101ZD
BLOCK DIAGRAM
RECEIVE
TRANSMIT
CONTROL
ANT
V1701 6146B PA
V1702 6146B PA
V1601 12BY7A DRIVE
KEYING
RF UNIT
Q101 3SK51 RF
Q102 J310 BUFF
Q103,104 2SK19GRx2 RX MIX
Q105,106 3SK40Mx2 TX MIX
Q107 2N4427 LOCAL AMP
160 15.9875MHz
80 17.9875
40 21.4875
20 28.4875
15 35.4875
10A 42.4875
10B 42.9875
10C 43.4875
10D 43.9875
JJY 19.4875
Q801 2SC372Y VFO OSC
Q802 2SK19GR BUFF
Q803 2SC372Y BUFF
5.5~5.0MHz
VFO UNIT
PREMIX LOCAL UNIT
Q601~610 2SC372x10 OSC
Q2201-2213, Q2301-2310 COUNTER UNIT
DS2101-2106 5082-7623 DISPLAY UNIT
KEYING CIRCUIT
PREMIX UNIT
Q302 2SC373 LOCAL AMP
Q301 2SK19GR LOCAL AMP
T301~314 BPF
Q303 SN76514 MIX
D207~209 1S1555 SW
EXT VFO
IF OUT
AGC OUT
Q406 2SK19BL ALC METER
Q405 3SK51 TX IF
ALC
Q407 2SA564A ALC METER
XF403 2.4kHz SSB FIL
Cf. 8987.5kHz
Q408 J310 IF
Q409 2SC372Y BUFF
Q203 2SC372Y FIX OSC
Q204 2SC372Y BUFF
FIX
5.5~5.0 MHz
NB & FIX UNIT
D411,412 1S1555 PRO OFF
Q404 2SC372Y BUFF
XF404 20kHz FIL
Q410 2SC372Y BUFF
Q206 2SC1583 NB AMP
Q205 2SC1583 NB AMP
Q201 2SC372Y NB AMP
PROC OFF
PROC OFF ALC
PROC ON
Q403 TA7060P RF PROC
D414,421 1S1007x2 NB GATE
Q411 MPS-A13 NB CONT
D203,204 1N60 PULSE DET
Q202 2SC372Y AGC AMP
D201,202 1N60 AGC DET
Q1003 2SA639 KEY SW
19.7475MHz
Q402 2SK19 BUFF
Q423 2SC372 BUFF
Q421 2SC535A VXO
Q422 2SC372Y BUFF
Q425 2SK19GR AGC BUFF
AGC
Q1002 2SC372Y KEY SW
RECT. B(M/BIAS) UNIT
KEY
XF402 600Hz CW FIL
Cf. 8988.3kHz
XF401 2.4kHz SSB FIL
Q412 3SK51 IF MIX
10.76MHz
XF405 2.8kHz SSB FIL
Q413,414 2SK19GRx2 MIX
Q420 2SA564 S.METER
Q419 2SK19GR S.METER
Q418 2SC372Y AGC AMP
300V 210V 180V -100V -35V
Q1001 2SA733 KEY
IF UNIT
CW, N
Q401 3SK51 TX IF
Q424 2SC1959 DELAY SW
Q415 3SK51 IF
Q416 3SK51 IF
Q417 2SC372Y AGC BUFF
D416,417 1N60 AGC DET
METER LAMP
12V
8V REG
D502~505 1S1007x4 BM
1/4 Q503 MC3403P DC AMP
Q504 74LS123 CONT
Q512 2SC1383 RL DRIVE
Q507 2SC1000GR AF AMP
25kHz
Q510 2SC1815Y BUFF
Q2 2SA496 DIM CONT
Q3 μPC14308 REG
Q515 2SA564 CW TR SW
Q513 2SC1815Y BUFF
CARRIER
Q502 TA7063P MIC AMP
1/4 Q503 MC3403P VOX AMP
5V
Q505 78L05 REG
Q508 2SC1000GR AF AMP
Q506 MC14024B DIV
REG 12V
Q901 78L12 REG
Q516 2SC1815Y CW TR SW
Q514 2SK19GR OSC
USB 8989kHz (CW. RX)
LSB 8986kHz
CW TX 8988.3kHz
1/4 Q503 MC3403P VOX AMP
1/4 Q503 MC3403P ANTI TRIP
Q511 2SC373 SIDE TONE
Q501 μPC2002H AF PA
MARKER
Q509 2SC1815Y OSC
3200kHz
Q1 2SB616 REG
Q903 2SA495 REG
RECT. A(H/L VOLT) UNIT
SIDE TONE/SEMI BREAK IN CIRCUIT
AF UNIT
+800V
MIC
SP


FT-101ZD
BLOCK DIAGRAM
Serial No. 080001~
AM MODE RX
RECEIVE
TRANSMIT
CONTROL
ANT
RF UNIT
IF UNIT
AF UNIT
AM UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
NB & FIX UNIT
COUNTER UNIT
DISPLAY UNIT
RECT. B(M/BIAS) UNIT
RECT. A(H/L VOLT) UNIT
V1701 6146B PA
V1702 6146B PA
V1601 12BY7A DRIVE
KEYING
Q101 3SK51 RF
Q102 J310 BUFF
Q103,104 2SK19GRx2 RX MIX
Q105,106 3SK40Mx2 TX MIX
Q107 2N4427 LOCAL AMP
Q2201-2213, Q2301-2310
DS2101-2106 5082-7623
160 15.9875MHz
80 17.9875
40 21.4875
20 28.4875
15 35.4875
10A 42.4875
10B 42.9875
10C 43.4875
10D 43.9875
JJY 19.4875
Q601~610 2SC372x10 OSC
Q801 2SC372Y VFO OSC
Q802 2SK19GR BUFF
Q803 2SC372Y BUFF
5.5~5.0MHz
Q207~209 1S1555 SW
EXT VFO
Q303 SN76514 MIX
T301~314 BPF
Q301 2SK19GR LOCAL AMP
Q302 2SC373 LOCAL AMP
Q405 3SK51 TX IF
ALC
Q406 2SK19BL ALC METER
Q407 2SA564A ALC METER
Q2406 3SK51 TX IF
AM
SSB CW
Q408 J310 IF
Q409 2SC372Y BUFF
IF OUT
FIX
Q203 2SC372Y FIX OSC
Q204 2SC372Y BUFF
Cf. 8987.5kHz
XF403 2.4kHz SSB FIL
Q2405 2SC380Y AM MOD
XF404 20kHz FIL
Q410 2SC372Y BUFF
Q206 2SC1583 NB AMP
Q205 2SC1583 NB AMP
Q201 2SC372Y NB AMP
AGC OUT
Q404 2SC372Y BUFF
D411,412 1S1555 PRO OFF
Q2404 2SK19GR OSC
8988.3kHz
Q2407 2SC380Y AM SW
Q403 TA7060P RF PROC.
PROC OFF
PROC OFF ALC
PROC ON
D414,421 1S1007x2 NB GATE
Q411 MPS-A13 NB CONT
D203,204 1N60 PULSE DET
Q202 2SC372Y AGC AMP
D201,202 1N60 AGC DET
Q1003 2SA639 KEY SW
19.7475MHz
Q402 2SK19 BUFF
Q423 2SC372 BUFF
Q421 2SC535A VXO
Q422 2SC372Y BUFF
Q425 2SK19GR AGC BUFF
Q1002 2SC372Y KEY SW
Q2402 2SC1815Y MIC AMP
Q2401 2SC732GR MIC AMP
Cf. 8988.3kHz
XF402 600Hz CW FIL
XF401 2.4kHz SSB FIL
Q412 3SK51 IF MIX
10.76MHz
XF405 2.8kHz SSB FIL
Q413,414 2SK19GRx2 MIX
Q420 2SA564 S.METER
Q419 2SK19GR S.METER
Q418 2SC372Y AGC AMP
Q1001 2SA733 KEY
KEY
300V 210V 180V -100V -35V
Q401 3SK51 TX IF
Q424 2SC1959 DELAY SW
Q415 3SK51 IF
Q416 3SK51 IF
Q417 2SC372Y AGC BUFF
D416,417 1N60 AGC DET
METER LAMP
12V
8V REG
Q2408 2SC380Y AM IF
D502~505 1S1007x4 BM
1/4 Q503 MC3403P DC AMP
Q504 74LS123 CONT
Q512 2SC1383 RL DRIVE
Q507 2SC1000GR AF AMP
25kHz
Q510 2SC1815Y BUFF
Q2 2SA496 DIM CONT
Q3 μPC14308 REG
D2406 1N60 AM DET
Q515 2SA564 CW TR SW
Q513 2SC1815Y BUFF
Q502 TA7063P MIC AMP
1/4 Q503 MC3403P VOX AMP
Q505 78L05 REG
Q508 2SC1000GR AF AMP
Q506 MC14024B DIV
REG 12V
Q901 78L12 REG
Q2409 2SC1815Y AF AMP
Q516 2SC1815Y CW TR SW
Q514 2SK19GR OSC
USB 8989kHz (CW. RX)
LSB 8986kHz
CW TX 8988.3kHz
1/4 Q503 MC3403P ANTI TRIP
Q511 2SC373 SIDE TONE
Q501 μPC2002H AF PA
MARKER
Q509 2S1815Y OSC
3200kHz
Q1 2SB616 REG
Q903 2SA496 REG
+800V
MIC
SP


FT-101ZD
BLOCK DIAGRAM
Serial No. 080001~
AM MODE TX
RECEIVE
TRANSMIT
CONTROL
RF UNIT
IF UNIT
AF UNIT
AM UNIT
VFO UNIT
PREMIX UNIT
NB & FIX UNIT
COUNTER UNIT
DISPLAY UNIT
PREMIX LOCAL UNIT
ANT
MIC
SP
KEY

# FREQUENCY RELATIONSHIPS




| | CARRIER FREQUENCY | |
|---|---|---|
| | R X | T X |
| USB | 8989kHz | 8989kHz |
| LSB | 8986kHz | 8986kHz |
| CW | 8989kHz | 8988.3kHz |



| BAND | FREQUENCY |
|---|---|
| 160 m | 15.9875 MHz |
| 80 | 17.9875 |
| 40 | 21.4875 |
| 30▲ | 24.4875 |
| 20 | 28.4875 |
| 17▲ | 32.4875 |
| 15 | 35.4875 |
| 12▲ | 38.9875 |
| 10A | 42.4875 |
| 10B | 42.9875 |
| 10C | 43.4875 |
| 10D | 43.9875 |

| BAND | RANGE |
|---|---|
| 160 m | 10.4875–10.9875 MHz |
| 80 | 12.4875–12.9875 |
| 40 | 15.9875–16.4875 |
| 30▲ | 18.9875–19.4875 |
| 20 | 22.9875–23.4875 |
| 17▲ | 26.9875–27.9875 |
| 15 | 29.9875–30.4875 |
| 12▲ | 33.4875–33.9875 |
| 10 | 36.9875–38.9875 |

▲ After Prod. #17)

# CRYSTAL DATA FT-101ZD

| UNIT | FUNCTION | HOLDER | FREQUENCY (kHz) | MODE | LOAD C (pF) | EFFECTIVE RESISTANCE | DRIVE LEVEL |
|---|---|---|---|---|---|---|---|
| CRYSTAL | 160 m | HC-18/U | 15987.5 | 3rd overtone | 30 | 80 (Ω) | 2 mW |
| | 80 m | 〃 | 17987.5 | 〃 | 〃 | 60 | 〃 |
| | 40 m | 〃 | 21487.5 | 〃 | 〃 | 45 | 〃 |
| | ▲ 30 m | 〃 | 24487.5 | 〃 | 〃 | 45 | 〃 |
| | 20 m | 〃 | 28487.5 | 〃 | 〃 | 40 | 〃 |
| | ▲ 17 m | 〃 | 32487.5 | 〃 | 〃 | 40 | 〃 |
| | 15 m | 〃 | 35487.5 | 〃 | 〃 | 40 | 〃 |
| | ▲ 12 m | 〃 | 38987.5 | 〃 | 〃 | 40 | 〃 |
| | 10 m(A) | 〃 | 42487.5 | 〃 | 〃 | 40 | 〃 |
| | 10 m(B) | 〃 | 42987.5 | 〃 | 〃 | 40 | 〃 |
| | 10 m(C) | 〃 | 43487.5 | 〃 | 〃 | 40 | 〃 |
| | 10 m(D) | 〃 | 43987.5 | 〃 | 〃 | 40 | 〃 |
| | WWV (5 MHz) | 〃 | 19487.5 | 〃 | 〃 | 40 | 〃 |
| CARRIER | LSB | HC-18/U | 8986 | Fundamental | 35 | 30 | 10 mW |
| | USB | 〃 | 8989 | 〃 | 〃 | 35 | 〃 |
| | CW | 〃 | 8988.3 | 〃 | 〃 | 35 | 〃 |
| | AM | 〃 | 8988.3 | 〃 | 〃 | 35 | 〃 |
| IF | Width | 〃 | ★cf. 19747.5 | Fundamental | 〃 | 15 | 2 mW |
| COUNTER | Local | 〃 | 18000 | 〃 | 〃 | 15 | 10 mW |
| | Local | 〃 | 18500 | 〃 | 〃 | 15 | 〃 |
| | Clock | HC-14/W | 655.36 | 〃 | 23 | 7K | 2 mW |
| VOX/MARK | Marker | HC-6/W | 3200 | 〃 | 〃 | 50 | 5 mW |

★XCO FREQUENCY : 19743–19753 kHz (▲ After Prod. #17)
Decided by circuit

# CIRCUIT DESCRIPTION

The block diagram and following circuit description will provide you with a better understanding of the design of this transceiver. The circuit description is tailored to the full-feature FT-101ZD, and the reader should note that the counter unit and digital display are optional features for the FT-101Z.

The FT-101ZD consists of a premix-type single conversion system, using a 9 MHz IF for all modes of operation.

## RECEIVER

The RF input signal from the antenna is fed through antenna relay $RL_2$, lamp fuse $FH_2$, attenuator switch $S_{2004}$ (located on the LEVER SW unit, PB-1975), 9 MHz trap $L_{2101}$ and $C_{1207}$ (located on the TRIMMER A UNIT), and input transformer $T_1$ to pin 3 of the RF UNIT.

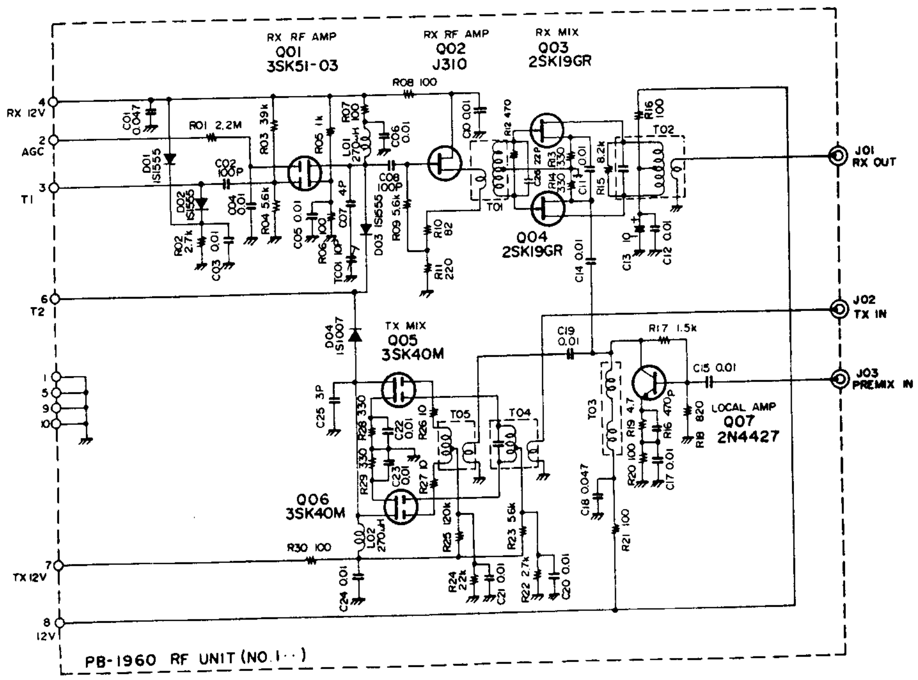
### RF UNIT (PB-1960) Early model (before Prod. #17)

The incoming signal is amplified by the RF amplifier, $Q_{101}$ **(3SK51-03)**, a dual-gate MOSFET used in a grounded source configuration. This transistor has superior immunity from intermodulation distortion. The amplified signal is then fed through a source follower, $Q_{102}$ **(J310)**, to the balanced mixer consisting of $Q_{103}$ and $Q_{104}$ **(2SK19GR)**, where the input signal is heterodyned with the local oscillator signal. The local signal is delivered from buffer amplifier $Q_{107}$ **(2N4427)**, and the resulting IF signal of 8.9875 MHz is fed through $T_{102}$ to $J_{101}$.

The input and output of the RF amplifier are permeability-tuned circuits, resulting in high sensitivity and excellent rejection of unwanted out-of-band signals.

### IF UNIT (PB-1963)

The IF signal at pin 9 of $J_{403}$ is amplified by $Q_{408}$ **(J310)** and passed through a monolithic filter, $XF_{404}$, which has a ±10 kHz bandwidth. The monolythic filter provides early protection from IMD, while providing a wide-bandwidth point for noise blanking. The IF signal is then fed to noise blanker gate $D_{414}$, $D_{412}$ **(1S1007)**, which functions as an ON/OFF switch controlled by noise blanker driver $Q_{411}$**(MPSA13)**.



The IF signal is then passed through the SSB filter $XF_{401}$ (or optional CW filter $XF_{402}$). Selection of the filter to be used is made by diodes $D_{405}$ - $D_{408}$ (1S1007), depending on the mode of operation.

The IF signal is then fed to the IF first mixer, $Q_{412}$ (3SK51-03), where the incoming signal is heterodyned with a 19.7475 MHz $\pm\Delta f$ local signal delivered from crystal oscillator $Q_{421}$ (2SC535A) and buffer amplifier $Q_{423}$ (2SC372Y), resulting in a signal of 10.76 MHz $\pm\Delta f$.

The new 10.76 MHz $\pm\Delta f$ signal is fed through filter $XF_{405}$ to the IF second mixer, $Q_{413}/Q_{414}$ (2SK19GR), where the filtered signal is heterodyned with the 19.7475 MHz $\pm\Delta f$ signal delivered from $Q_{422}$ (2SC372Y), resulting in an 8.9875 MHz IF signal, the same as the original IF.

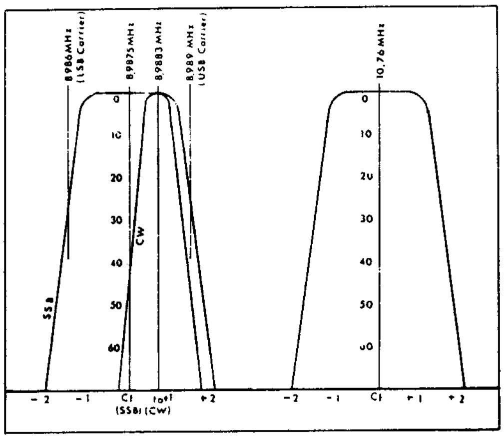
This process varies the IF signal across the passband of the second IF filter. The combination of the two filters, $XF_{401}$ and $XF_{405}$, provides continuously variable width of the IF passband. The frequency of crystal oscillator $Q_{421}$ is varied by varactor diode $D_{418}$ (1S2209).

The output from the IF second mixer is fed to a two-stage IF amplifier, consisting of $Q_{415}$ and $Q_{416}$ (3SK51-03), and delivered through diode switch $D_{401}$ (1S1555) to the AF UNIT.

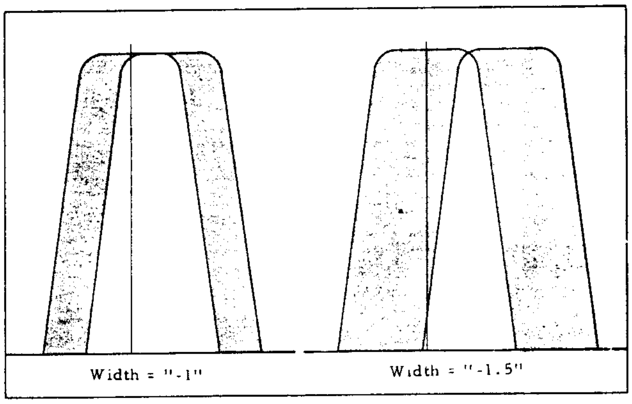
A portion of the output from $Q_{416}$ is rectified by $D_{416}$ and $D_{417}$ (1N60) to produce AGC voltage. $Q_{417}$ (2SC372Y) provides the necessary buffering between the IF and AGC circuits. The AGC voltage is amplified by $Q_{418}$ (2SC372Y), and applied to gate 2 of the RF and IF amplifiers, to control the gain of these stages. The AGC voltage is also amplified by $Q_{419}$ (2SK19GR) for S-meter indication.

For use with the FV-901DM scanning VFO, or other optional equipment, the AGC voltage is fed through buffer $Q_{425}$ (2SK19GR) and fed to the AGC OUT terminal on the EXT VFO jack, located on the rear panel.

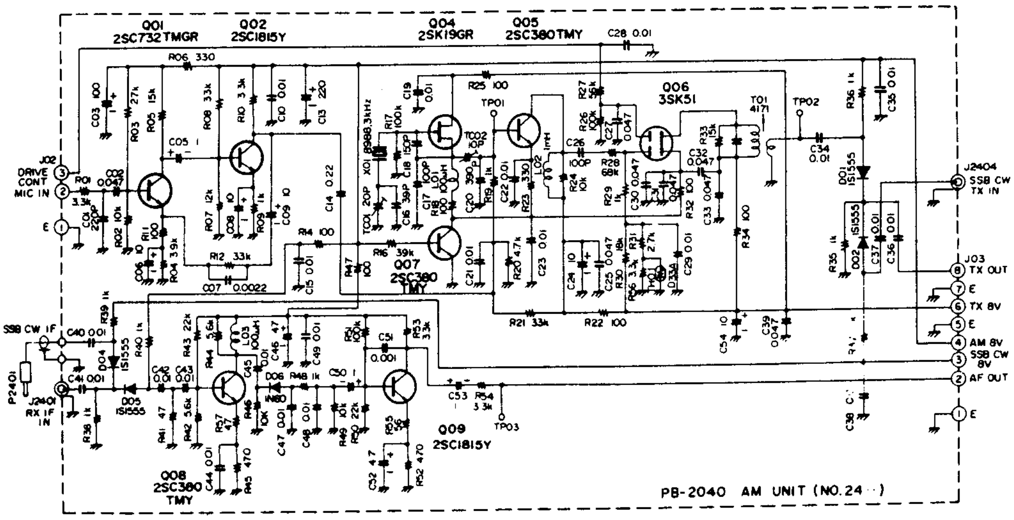
On AM, the output signal from $Q_{416}$ is amplified by $Q_{2408}$ (2SC380Y) and passed to the AM detector, $D_{2406}$ (1N60). The resulting audio signal is amplified by $Q_{2409}$ (2SC1815Y) and delivered to the final audio stage.

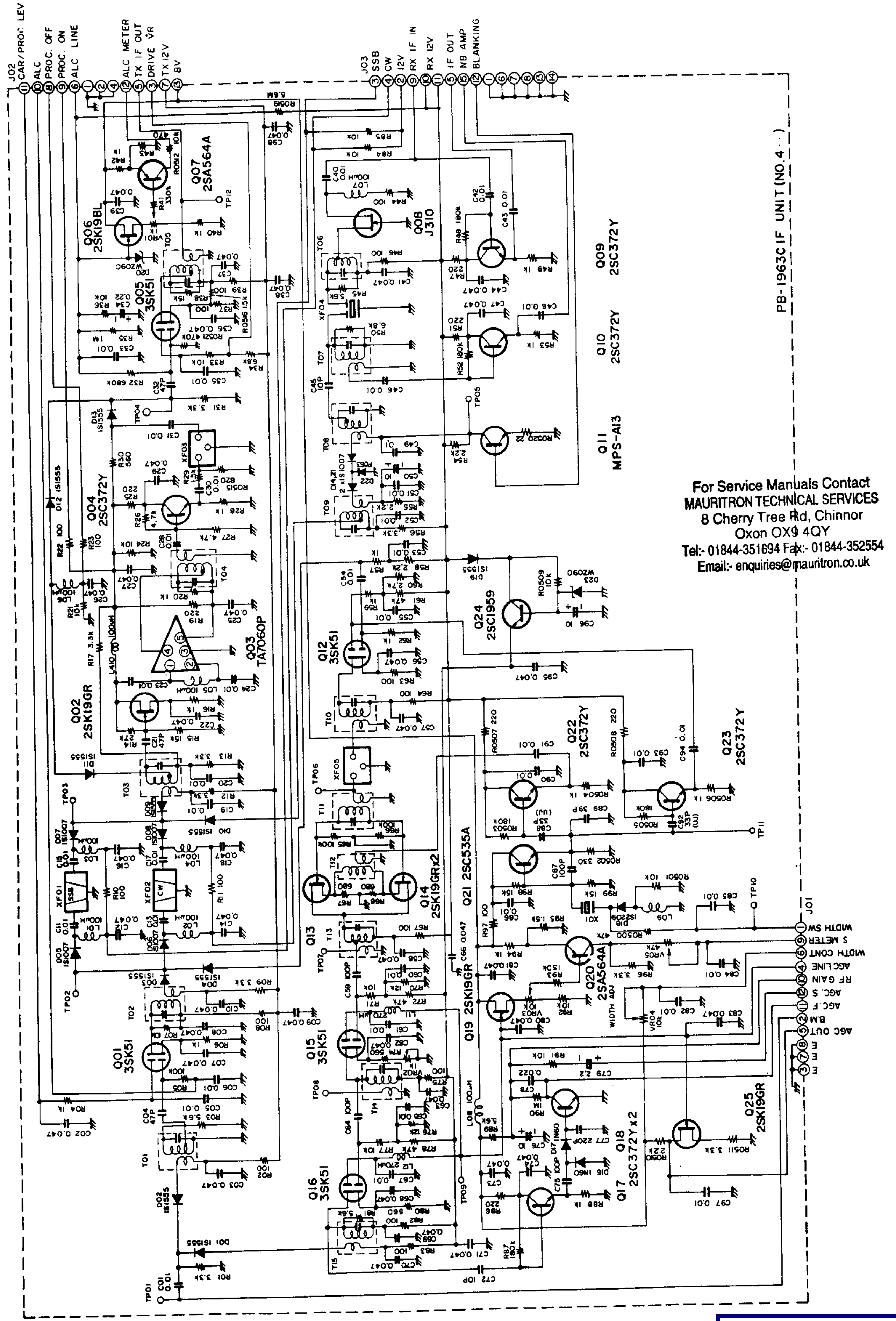



**SSB, CW Filters** **WIDTH Filter**




**Width Control Action**




PB-1963C IF UNIT (NO.4)
Q01 3SK51
Q02 2SK19GR
Q03 TA7060P
Q04 2SC372Y
Q05 3SK51
Q06 2SK19BL
Q07 2SA564A
Q08 J310
Q09 2SC372Y
Q10 2SC372Y
Q11 MPS-A13
Q12 3SK51
Q13
Q14 2SK19GRx2
Q15 3SK51
Q16 3SK51
Q17 2SC372Yx2
Q18
Q19 2SK19GR
Q20 2SA564A
Q21 2SC535A
Q22 2SC372Y
Q23 2SC372Y
Q24 2SC1959
Q25 2SK19GR
J02
CAR/PROC LEV
ALC
PROC. OFF
PROC. ON
ALC LINE
ALC METER
TX IF OUT
DRIVE VR
TX 12V
8V
J03
SSB
CW
12V
RX IF IN
RX 12V
IF OUT
NB AMP
BLANKING
J01
WIDTH SW
S METER
WIDTH CONT
AGC LINE
RF GAIN
AGC S
AGC F
B.M
AGC OUT
E

## NB-FIX UNIT (PB-1961)

A portion of the 8.9 MHz IF signal is fed through buffer $Q_{410}$ (2SC372Y) and amplified by $Q_{206}$ and $Q_{205}$ (2SC1583).

When a carrier of noise-free modulated signal is received, the IF signal is rectified by $D_{201}$ and $D_{202}$ (1N60), producing a DC voltage. This DC voltage is amplified by $Q_{202}$ (2SC372Y), which charges $C_{214}$, for AGC purposes. The AGC voltage is used to control the gain of $Q_{206}$ and $Q_{205}$.

When impulse-type noise is received, $D_{203}$ and $D_{204}$ (1N60) rectify the IF signal, producing a DC voltage which controls the NB switch $Q_{411}$ (MPS-A13).

Noise pulses have a very short duration, but high amplitude. Because of the very slow time constant of the $C_{214}/R_{212}$ discharge path, AGC voltage is not induced by these short-duration pulses. Therefore, $Q_{206}$ and $Q_{205}$ operate at full gain, providing maximum voltage to the base of $Q_{411}$. When a pulse is received, $Q_{411}$ biases $D_{414}$ to block the signal path momentarily. When a desired signal and a noise pulse are received simultaneously, the blanking action is not impaired, because the relative amplitude difference between the desired signal and the noise pulse is still high. The front panel noise blanker level control varies the DC voltage applied to the base of $Q_{411}$.

## AF UNIT (PB-1964)

The IF signal from pin 2 is fed through $T_{501}$ to the ring demodulator, consisting of $D_{502}$ - $D_{505}$ (1S1007), where the IF signal is demodulated into audio, using the carrier signal delivered from $Q_{513}$ (2SC1815Y). The carrier signal is generated by oscillator $Q_{514}$ (2SK19GR), and it oscillates at one of the following frequencies:

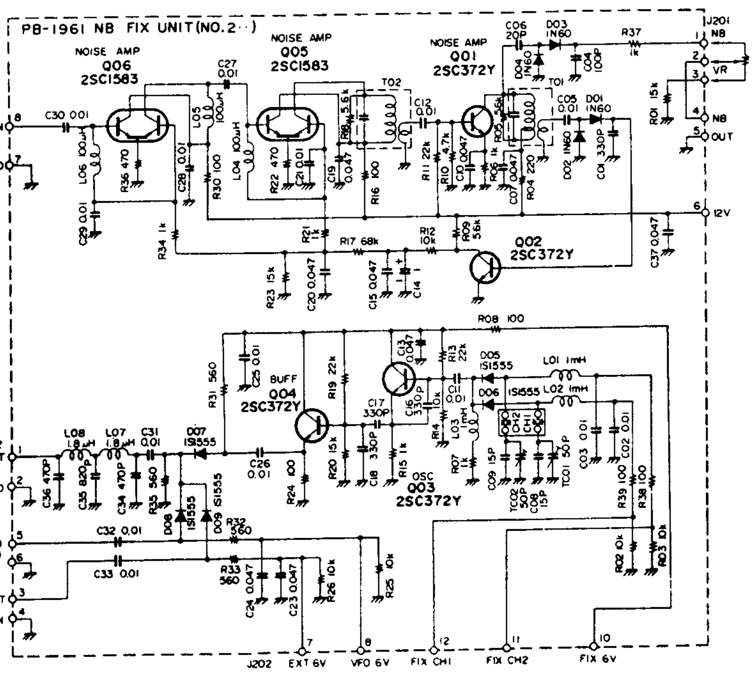
| | |
|---|---|
| USB, CW·RX | 8989 KHz |
| LSB | 8986 KHz |
| CW·TX | 8988.3 KHz |

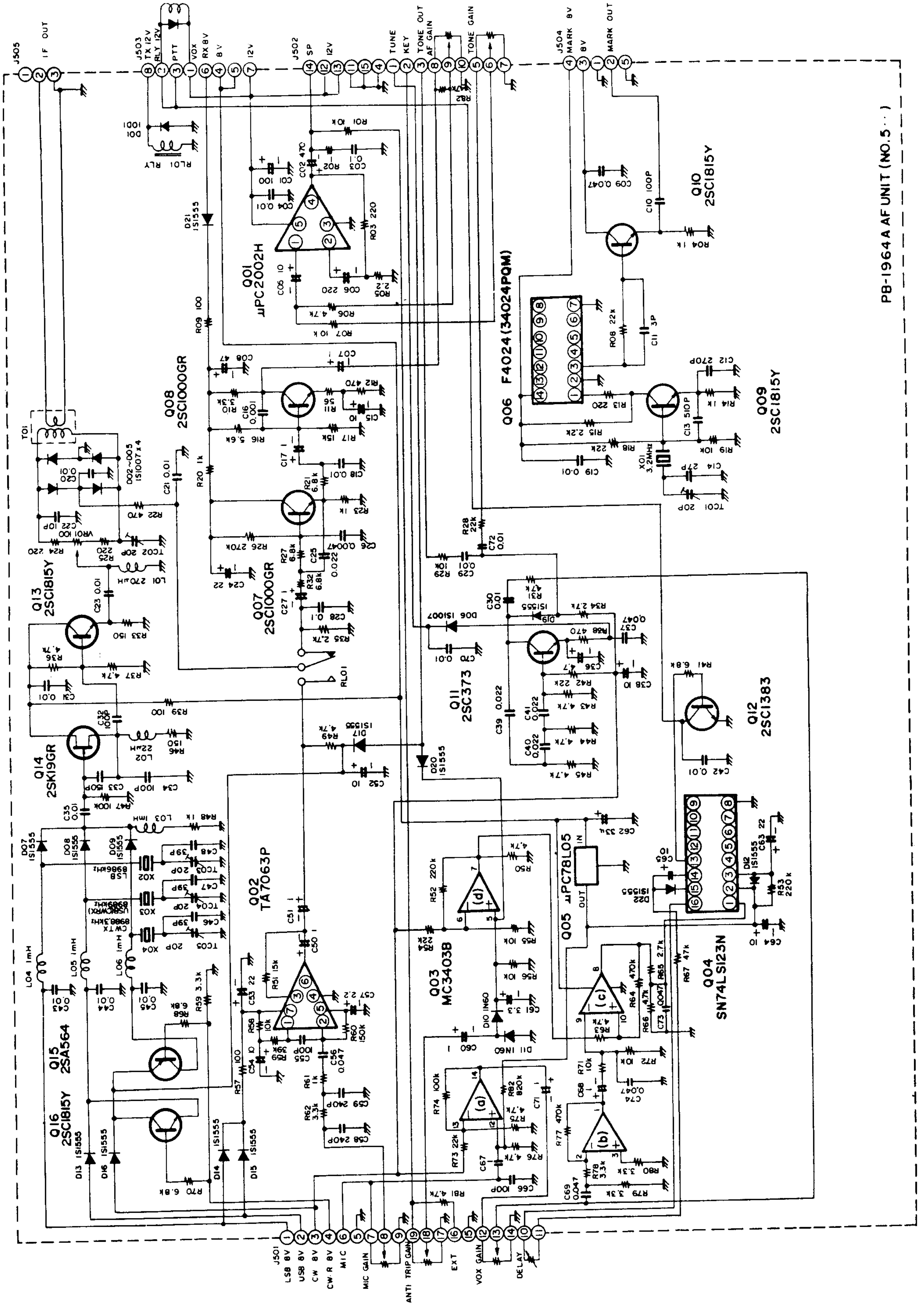
The audio signal is then amplified by audio amplifiers $Q_{507}$, $Q_{508}$ (2SC1000GR), and $Q_{509}$ ($\mu$PC2002), delivering 3 watts of audio output to the speaker.

The audio spectrum is shaped by an active low-pass filter of $f_0$ = 2.7 kHz, −12 dB/octave.

## MARKER GENERATOR

A 25 kHz marker signal is provided, for alignment and testing purposes. Marker generator $Q_{509}$ (2SC1815Y) generates a basic 3200 kHz signal, which is divided into 25 kHz multiples by $Q_{506}$ (MC14024B), a binary counter.




PB-1964A AF UNIT (NO.5 · · )
Q01 μPC2002H
Q02 TA7063P
Q03 MC3403B
Q04 SN74LS123N
Q05 μPC78L05
Q06 F4024(34024PQM)
Q07 2SC1000GR
Q08 2SC1000GR
Q09 2SC1815Y
Q10 2SC1815Y
Q11 2SC373
Q12 2SC1383
Q13 2SC1815Y
Q14 2SK19GR
Q15 2SA564
Q16 2SC1815Y

## TRANSMIT CIRCUIT

### SSB MODE

The output from microphone jack $J_2$ is fed through the MIC GAIN control $VR_{3a}$ to pin 8 of the AF UNIT.

### AF UNIT (PB-1964)

The speech signal from pin 8 is amplified by microphone amplifier $Q_{502}$ **(TA7063P)** and fed through relay $RL_{501}$ to the ring modulator, $D_{502}$ - $D_{505}$, where the speech signal modulates the carrier signal delivered from $Q_{513}$. The resulting double sideband signal is fed to the IF UNIT.

### IF UNIT (PB-1963)

The 8.9875 MHz double sideband signal is amplified by $Q_{401}$ **(3SK51-03)** and passed through sideband filter $XF_{401}$ by diode switches $D_{403}$, $D_{409}$ **(1S1555)**, $D_{405}$, and $D_{407}$ **(1S1007)**. Here the signal is converted to a single sideband signal by removal of the unwanted sideband.

The signal is then fed to buffer amplifier $Q_{402}$ **(2SK19GR)**. When the RF speech processor is OFF, diode switches $D_{411}$ and $D_{412}$ **(1S1555)** feed the IF signal to IF amplifier $Q_{405}$ **(3SK51-03)**. When the RF speech processor is ON, the SSB signal is amplified by buffer amplifier $Q_{402}$ **(2SK19GR)** and further amplified by limiter $Q_{403}$ **(TA7060P)**, where signals that exceed the preset clipping level are sliced out.

This highly clipped SSB signal is amplified by buffer amplifier $Q_{404}$ (2SC372Y) and passed through a selective filter, $XF_{403}$, which removes RF harmonics that result from signal clipping. The signal is then fed to IF amplifier $Q_{405}$, and subsequently delivered to the RF UNIT. The front panel COMP LEVEL control, $VR_4$, controls the voltage at gate 2 of $Q_{401}$, thus setting the processor level.

The return of the grid circuit of the final amplifier tubes is fed to $Q_{406}$ **(2SK19BL)**, which produces ALC voltage. This voltage is fed to gate 1 of $Q_{405}$, controlling the gain of this stage. When the RF processor is off, ALC voltage is also fed to gate 1 of $Q_{401}$. $Q_{407}$ **(2SA564)** amplifies the ALC voltage for indication on the front panel meter.

### RF UNIT (PB-1960) Early model (before Prod. #17)

The IF signal is fed through $T_{104}$ to the transmit mixer, consisting of parallel-connected $Q_{105}$ and $Q_{106}$ **(3SK40M)**, where the IF signal at gate 1 is mixed with the local signal fed to gate 2, producing the RF output signal. The RF signal is then fed through diode switch $D_{104}$ **(1S1007)** to the DRIVE UNIT.

### DRIVE UNIT (PB-1714), PA UNIT (PB-1715)

The RF signal is amplified by driver $V_{1601}$ **(12BY7A)**, and delivered to PA UNIT final amplifier tubes $V_{1701}$ and $V_{1702}$ **(6146B)**. The output from the final tubes is fed to the antenna jack.

A portion of the RF signal is coupled through $C_{14}$ to the cathode of the 12BY7A driver, for the purpose of improving the linearity of the final amplifier. This technique is known as RF negative feedback.

### CW MODE

For CW, the 8.9883 MHz carrier is generated by oscillator $Q_{514}$ at the frequency set by $X_{504}$. The carrier signal is fed through buffer $Q_{513}$ and fed to the ring modulator. The same carrier frequency is used in the tune mode.

DC voltage is applied through diode switch $D_{517}$ **(1S1555)** and relay $RL_{501}$, unbalancing the ring modulator for CW operation. The carrier signal is then fed to the IF UNIT. The signal path is identical to that on SSB, up to the DRIVE UNIT.

### DRIVE UNIT (PB-1714), PA UNIT (PB-1715)

Keying of the transmitter is accomplished by changing the bias voltage to the driver and final tubes. During "key up," the tubes are cut off by application of −35 volts to $V_{1601}$ and −110 volts to $V_{1701}$ and $V_{1702}$. These cutoff voltages are

reduced to –0.1 volt and –60 volts, respectively, during "key down" conditions.

The key is connected to the KEY 2 terminal on the RECT B board, PB-1968. When the key is closed, the base of $Q_{1001}$ **(2SA733)** is grounded, causing $Q_{1002}$ **(2SC372Y)** to conduct. The base of $Q_{1003}$ **(2SA639)** is thus set to 0 when the transistor conducts. Under these circumstances, the bias voltage applied to $V_{1601}$, $V_{1701}$, and $V_{1702}$ places these tubes in the normal operating condition.

## VOX circuit

A portion of the microphone input signal is amplified by three stages of $Q_{503}$ **(MC3403P)**, which drive the VOX control gate, $Q_{504}$ **(SN74LS123N)**. The output from pin 13 of $Q_{504}$ is fed to the base of $Q_{512}$ **(2SC1383)**, switching the VOX relay on and off according to the presence or absence of a speech signal.

A portion of the speaker output is detected by $D_{510}$ and $D_{511}$ **(1N60)**, providing a bucking voltage which is fed to $Q_{503}$, preventing the speaker output from tripping the VOX.

The VOX delay may be set by adjusting $VR_{2b}$ for the desired delay time.

## CW SIDETONE

CW sidetone oscillator $Q_{511}$ **(2SC373)** oscillates at a frequency of approximately 800 Hz. The output from $Q_{511}$ is amplified by the final audio amplifier, $Q_{501}$, for delivery to the speaker. The output from the sidetone oscillator is also fed to VOX amplifier $Q_{503}$, providing semi-break-in operation for CW.

## AM MODE

The speech signal from the microphone is amplified by $Q_{2401}$ **(2SC732GR)** and $Q_{2402}$ **(2SC1815Y)** and passed to modulator $Q_{2405}$ **(2SC380Y)**, where the speech signal modulates the AM carrier signal at 8988.3 kHz delivered from $Q_{2404}$ **(2SK19GR)**. The modulated signal is amplified by $Q_{2406}$ **(3SK51)** and delivered to transmit mixer $Q_{105}$/$Q_{106}$.

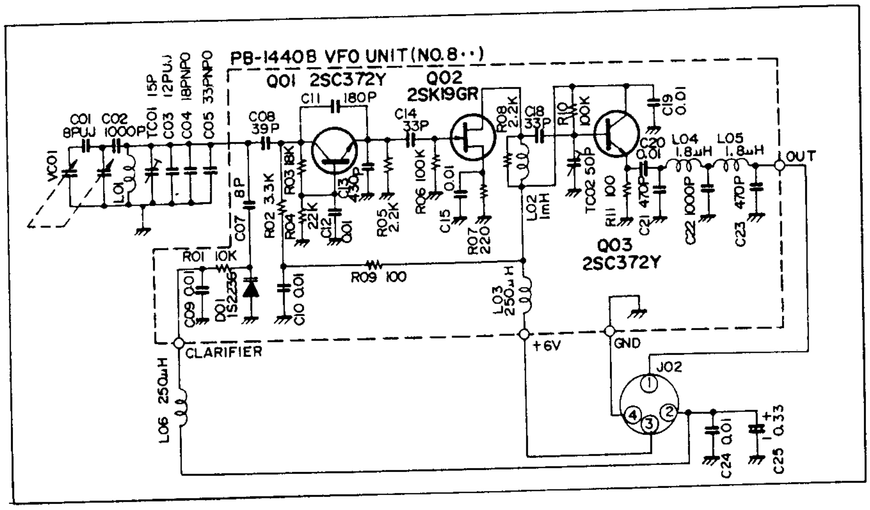


## COMMON CIRCUITS

## VFO UNIT (PB-1440B-3420)

A modified Colpitts-type oscillator is used to generate a 5.0 - 5.5 MHz VFO signal, thus producing a 500 kHz tuning range. The oscillator signal generated by $Q_{801}$ **(2SC372Y)** is varied by $VC_{801}$, which is geared to a precision-built dial tuning mechanism. $VC_{801}$ consists of two sections; the sub-blades compensate for the capacitance variation of the main blades, which may result from extreme temperature change.

Varactor diode $D_{801}$ **(1S2236)** may be varied by tuning $L_{806}$, providing ±2.5 kHz offset from the dial frequency (clarifier).



The VFO signal is amplified by buffer amplifiers $Q_{802}$ (2SK19GR) and $Q_{803}$ (2SC372Y), and passed to the PREMIX UNIT.

## NB & FIX UNIT (PB-1961)

Two crystal-controlled channels are provided for operation with this transceiver. The oscillator signal is generated by $Q_{203}$ (2SC372Y) and amplified by $Q_{204}$ (2SC372Y), and delivered to the PREMIX UNIT. Crystals $X_{201}$ and $X_{202}$ oscillate in the 5.0 - 5.5 MHz range.

## PREMIX LOCAL UNIT (PB-1711) (before Prod. #17)

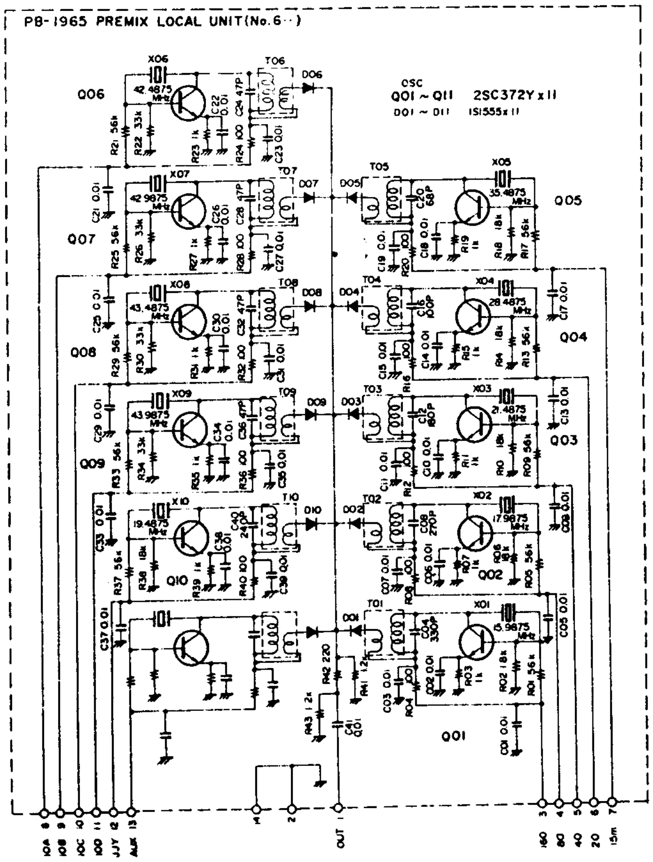
Crystal oscillators $Q_{601}$ - $Q_{610}$ (2SC372Y) generate the premix local signal at the frequencies shown in Table 3. Diode switches $D_{601}$ - $D_{610}$ (1S1555) select the proper local signal for the band in use. The local signal is then delivered to the PREMIX UNIT.

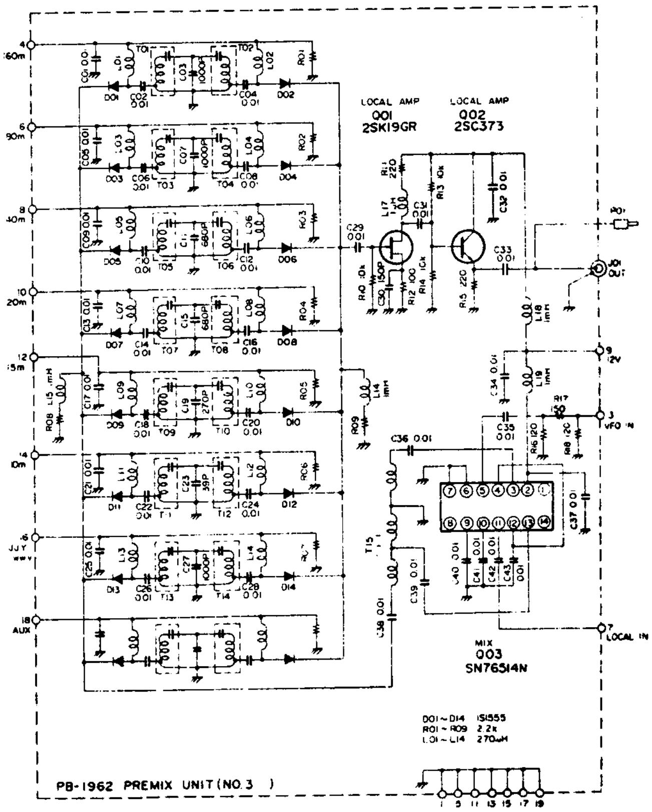
## PREMIX UNIT (PB-1962) (before Prod. #17)

The premix signal is produced at $Q_{303}$ (SN76514N), a double-balanced mixer, where the premix local signal from $Q_{601}$ - $Q_{610}$ is mixed with the VFO or crystal controlled 5 MHz signal. The premix output frequencies are shown in Table 3. The premix signal is passed through bandpass filter $T_{301}$ - $T_{314}$, and amplified by $Q_{301}$ (2SK19GR) and $Q_{302}$ (2SC373). The amplified signal is then fed to the RF UNIT, where the signal is further amplified by $Q_{107}$ for delivery to the transmitter and receiver mixers.

| | | XCO Frequency | PREMIX OUT Frequency |
|---|---|---|---|
| 160m | $X_{601}$ | 15.9875MHz | 10.4875~10.9875MHz |
| 80m | $X_{602}$ | 17.9875MHz | 12.4875~12.9875MHz |
| 40m | $X_{603}$ | 21.4875MHz | 15.9875~16.4875MHz |
| 20m | $X_{604}$ | 28.4875MHz | 22.9875~23.4875MHz |
| 15m | $X_{605}$ | 35.4875MHz | 29.9875~30.4875MHz |
| 10mA | $X_{606}$ | 42.4875MHz | 36.9875~37.4875MHz |
| 10mB | $X_{607}$ | 42.9875MHz | 37.4875~37.9875MHz |
| 10mC | $X_{608}$ | 43.4875MHz | 37.9875~38.4875MHz |
| 10mD | $X_{609}$ | 43.9875MHz | 38.4875~38.9875MHz |
| JJY/WWV | $X_{610}$ | 19.4875MHz | 13.9875~14.4875MHz |

Table 3



**COUNTER UNIT (PB-1978, PB-1979, PB-1980) (before Prod. #16)**

The premix local signal from the PREMIX LOCAL circuit is fed to amplifier $Q_{2301}$ (3SK51-03), located on PB-1980. The amplified signal is then fed to waveshaper $Q_{2302}$ (MC10116). $Q_{2303}$ (MPS3640) acts as an interface between $Q_{2302}$ and the TTL circuitry. The signal is then fed to the counter gate, $Q_{2304}$ (SN74S00N).

The clock pulses are generated by $Q_{2305}$ (MSM5564), which produces a 655.36 MHz signal. The signal is divided by a factor of $2^{17}$, producing a 5 Hz signal which is fed to the counter gate.

The pulses which pass through the gate are fed to decade counter $Q_{2309}$ (SN74196N), which counts 10 Hz digits. In turn, $Q_{2202}$ - $Q_{2207}$ (SN74LS196N) count 100 Hz, 1 kHz, 10 kHz, 100 kHz, 1 MHz, and 10 MHz digits. The BCD output signal from $Q_{2202}$ - $Q_{2207}$ is fed through drivers $Q_{2208}$ - $Q_{2213}$ (MSM561) to the display digits, $DS_{2101}$ - $DS_{2106}$ (HP 5082-7623).

The system of presetting the counter can best be explained by example. For a frequency of 3.500 MHz LSB, the premix local frequency is 12.486 MHz. The LSB preset code is 91.014.0. 12.486 + 91.0140.0 = 103.500. The "1" digit on the left-hand side is dropped (overflow), and the "0" preceeding the "3" causes a blanking signal to be sent to the 10 MHz digit. The result is a frequency of 3.500 MHz, and this number is displayed.

For USB, the preset number is 91.011.0. For a frequency of 14.000 MHz USB, the manipulation is as follows: 91.011 + 22.989 (Premix freq.) = 114.000. The first digit is the overflow digit, and the remaining digits are displayed. Note that the second digit from the left is not zero, so no blanking signal is sent to the 10 MHz digit.

For a CW or AM frequency of 21.000 MHz, the premix frequency is 29.9883, and the preset frequency is 91.011.7. The manipulation is: 91.011.7 + 29.9883 = 121.0000. The first digit is dropped, and the remaining digits are displayed.

The preset frequencies are programmed by $Q_{2307}$ and $Q_{2308}$ ($\mu$PA54H) and diode matrix $D_{2306}$ - $D_{2312}$ (1S1555). Please refer to Table 5 for definition of the premix frequencies for the various bands.

The 5 volt supply is regulated by $Q_{2310}$ ($\mu$PC 14305) for the TTL circuitry. The DIM control controls the emitter/collector voltage at $Q_{2201}$ (2SA496Y), to control the brightness of the digital display and lamps.

| | 10MHz | 1MHz | 100kHz | 10kHz | 1kHz | 100Hz |
|---|---|---|---|---|---|---|
| | ($Q_{2207}$) | ($Q_{2206}$) | ($Q_{2205}$) | ($Q_{2204}$) | ($Q_{2203}$) | ($Q_{2202}$) |
| LSB | 9 | 1 | 0 | 1 | 4 | 0 |
| USB | 9 | 1 | 0 | 1 | 1 | 0 |
| CW AM | 9 | 1 | 0 | 1 | 1 | 7 |

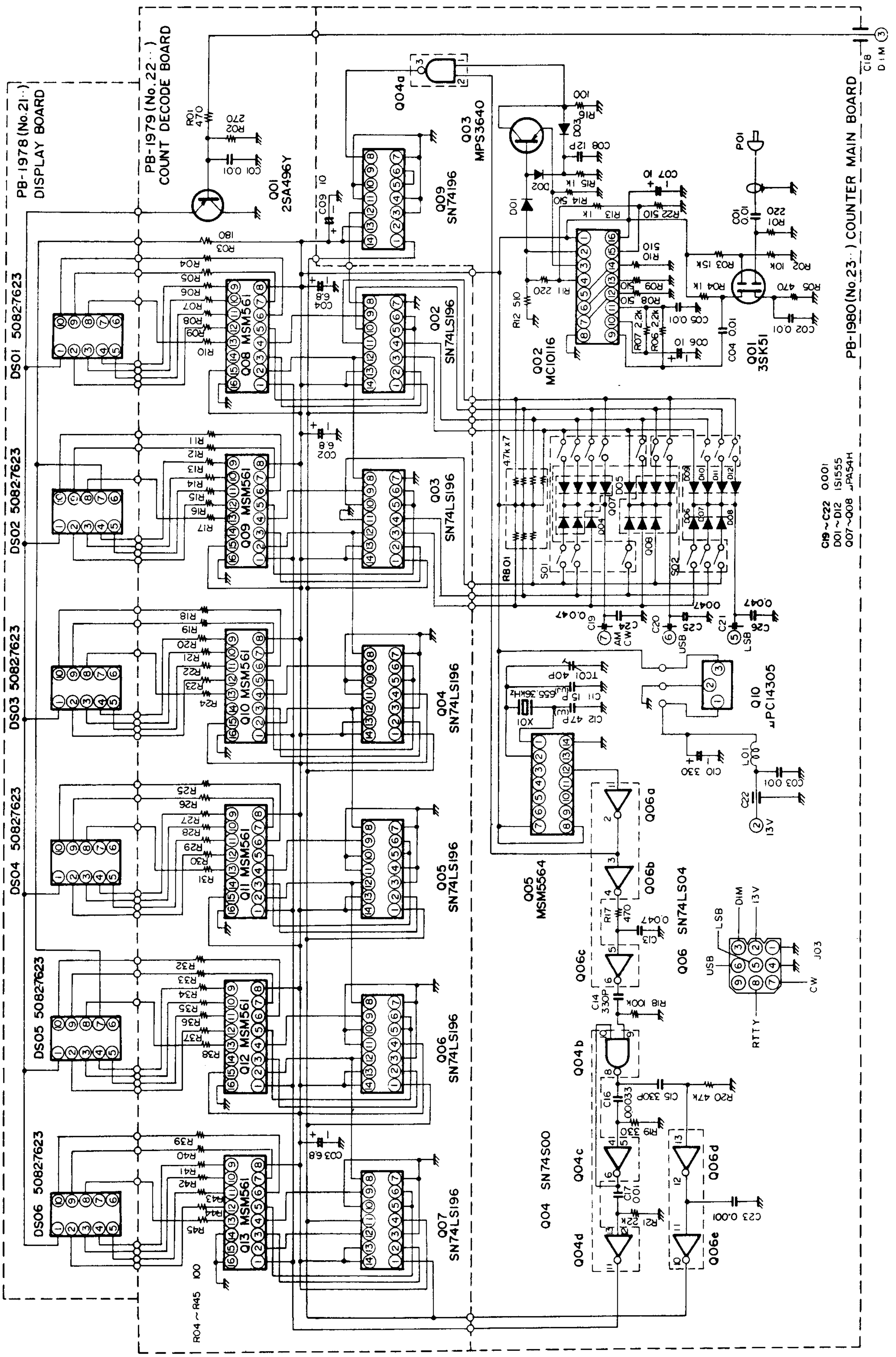
**Preset Number**

**Table 4**



| | Nominal Premix Local Frequency | LSB | USB | CW / AM |
|---|---|---|---|---|
| 160m | 10.4875 – 10.9875(MHz) | 10.486 – 10.986(MHz) | 10.489 – 10.989(MHz) | 10.4883 – 10.9883(MHz) |
| 80m | 12.4875 – 12.9875 | 12.486 – 12.986 | 12.489 – 12.989 | 12.4883 – 12.9883 |
| 40m | 15.9875 – 16.4875 | 15.986 – 16.486 | 15.989 – 16.489 | 15.9883 – 16.4883 |
| 20m | 22.9875 – 23.4875 | 22.986 – 23.486 | 22.989 – 23.489 | 22.9883 – 23.4883 |
| 15m | 29.9875 – 30.4875 | 29.986 – 30.486 | 29.989 – 30.489 | 29.9883 – 30.4883 |
| 10mA | 36.9875 – 37.4875 | 36.986 – 37.486 | 36.989 – 37.489 | 36.9883 – 37.4883 |
| 10mB | 37.4875 – 37.9875 | 37.486 – 37.986 | 37.489 – 37.989 | 37.4883 – 37.9883 |
| 10mC | 37.9875 – 38.4875 | 37.986 – 38.486 | 37.989 – 38.489 | 37.9883 – 38.4883 |
| 10mD | 38.4875 – 38.9875 | 38.486 – 38.986 | 38.489 – 38.989 | 38.4883 – 38.9883 |

**Table 5**


PB-1978 (No.21··) DISPLAY BOARD
PB-1979 (No.22··) COUNT DECODE BOARD
PB-1980 (No.23··) COUNTER MAIN BOARD
DS01 50827623
DS02 50827623
DS03 50827623
DS04 50827623
DS05 50827623
DS06 50827623
Q08 MSM561
Q09 MSM561
Q10 MSM561
Q11 MSM561
Q12 MSM561
Q13 MSM561
Q01 2SA496Y
Q02 SN74LS196
Q03 SN74LS196
Q04 SN74LS196
Q05 SN74LS196
Q06 SN74LS196
Q07 SN74LS196
Q09 SN74196
Q03 MPS3640
Q02 MC10116
Q01 3SK51
Q05 MSM5564
Q06 SN74LS04
Q04 SN74S00
Q10 µPC14305
R04 ~ R45 100
C19 ~ C22 0.001
D01 ~ D12 1S1555
Q07 ~ Q08 µPA54H
RB01 47k x7
X01 655.36kHz
J03
USB
LSB
CW
DIM
13V
RTTY
AM
S01
S02
P01

## POWER SUPPLY

The power supply is designed to operate from 100/110/117/200/220/234 volts AC. A DC-DC converter is an available option, providing operation from 13.5 volts DC. Insertion of the appropriate power plug into the rear panel receptacle makes the necessary connections for AC or DC operation.

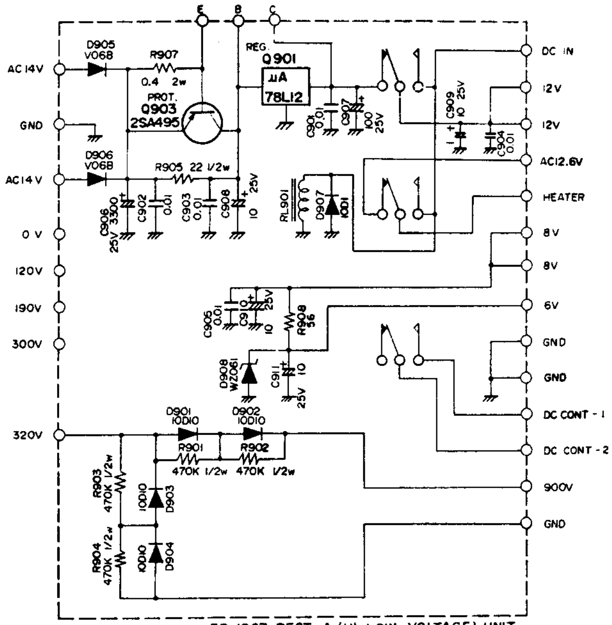
When the transceiver is operated from a DC 13.5 volt power source, using the optional DC-DC converter, transistors $Q_{3201}$ and $Q_{3202}$ **(T20A6)** function as a low frequency oscillator, providing AC voltage at approximately 80 Hz to the power transformer. All of the tube heaters receive their power through the HEATER switch on the front panel. When the HEATER switch is OFF, voltage is still supplied to the receiver section, thus allowing continuous reception with reduced power consumption. The heaters of the two 6146B are connected in series to operate at 12 volts DC.

The 14 volt AC power delivered from the secondary winding of the power transformer is rectified by $D_{905}$ and $D_{906}$ **(V06B)**. Voltage regulators $Q_1$ **(2SB616)**, $Q_{901}$ **(78L12)**, and $Q_{903}$ **(2SA495)** stabilize the DC supply at 12 volts. The supply voltage is further stabilized at 8 volts by $Q_3$ **($\mu$PC14308)** for delivery to the counter, AF, and other units. The 6 volt supply for the VFO is provided through zener diode $D_{908}$ **(WZ061)**, while the 5 volt supply for the TTL integrated circuits is provided by $Q_{505}$ **(78L05)**.

The power amplifier plate voltage of +800 volts is supplied from the bridge-controlled doubler, located on the RECT. A UNIT, and consisting of $D_{901}$ - $D_{904}$ **(10D10)**.

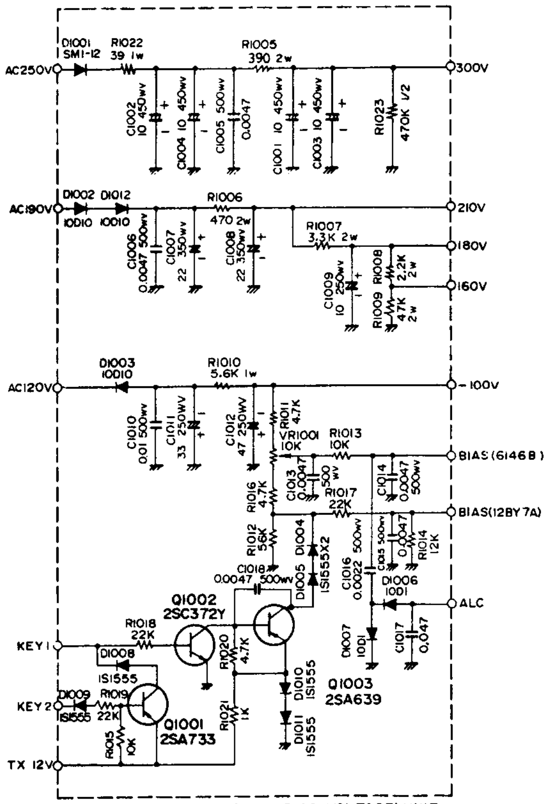
AC 190 volts is rectified by $D_{1002}$ **(10D10)**, producing 210 volts for the screen grid supply of the power amplifier tubes. The screen grid voltage for the driver tube is obtained by rectifying 250 volts AC at $D_{1001}$ **(10D10)**, producing 300 volts. This voltage is dropped to 180 volts by a resistor for delivery to the driver tube screen grid.

The 120 volt AC power from the transformer secondary winding is rectified by $D_{1003}$ **(10D10)** in order to obtain −140 volts for the driver and final amplifier tube grid bias.



PB-1967 RECT. A (HI-LOW VOLTAGE) UNIT

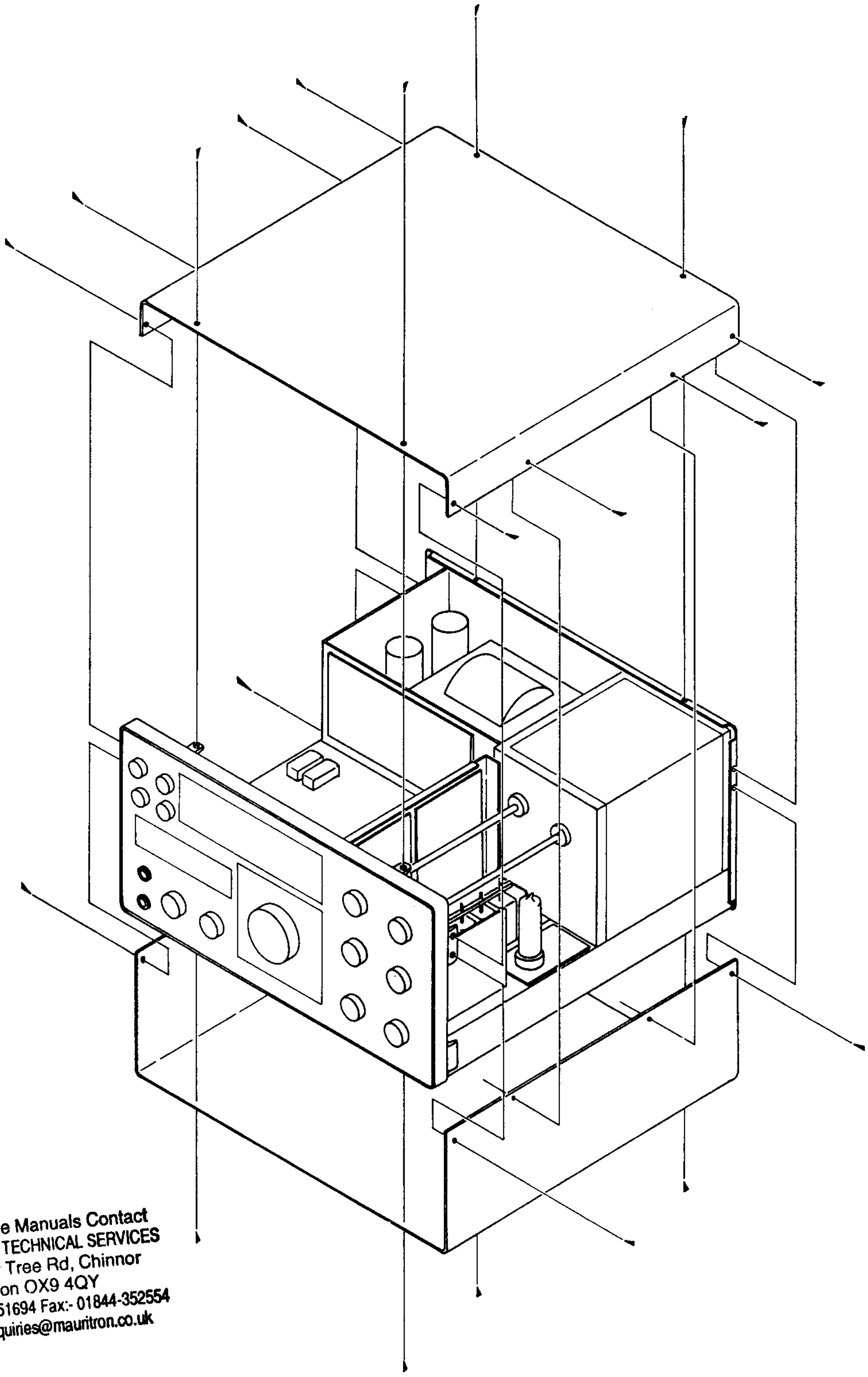




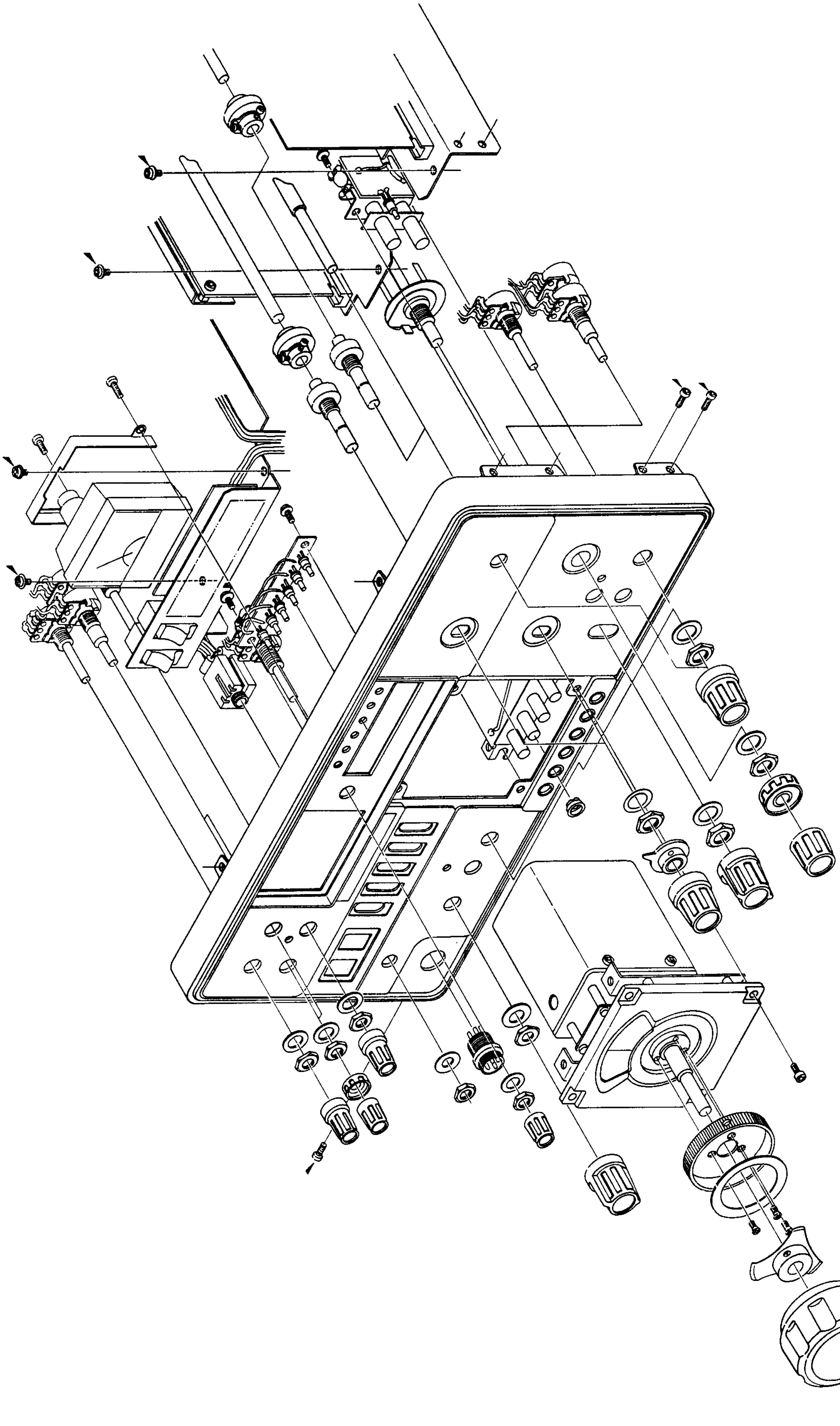
PB-1968 RECT. B( M. BIAS VOLTAGE) UNIT

# SECTION 3 – SERVICING

# OUTER COVER REMOVAL

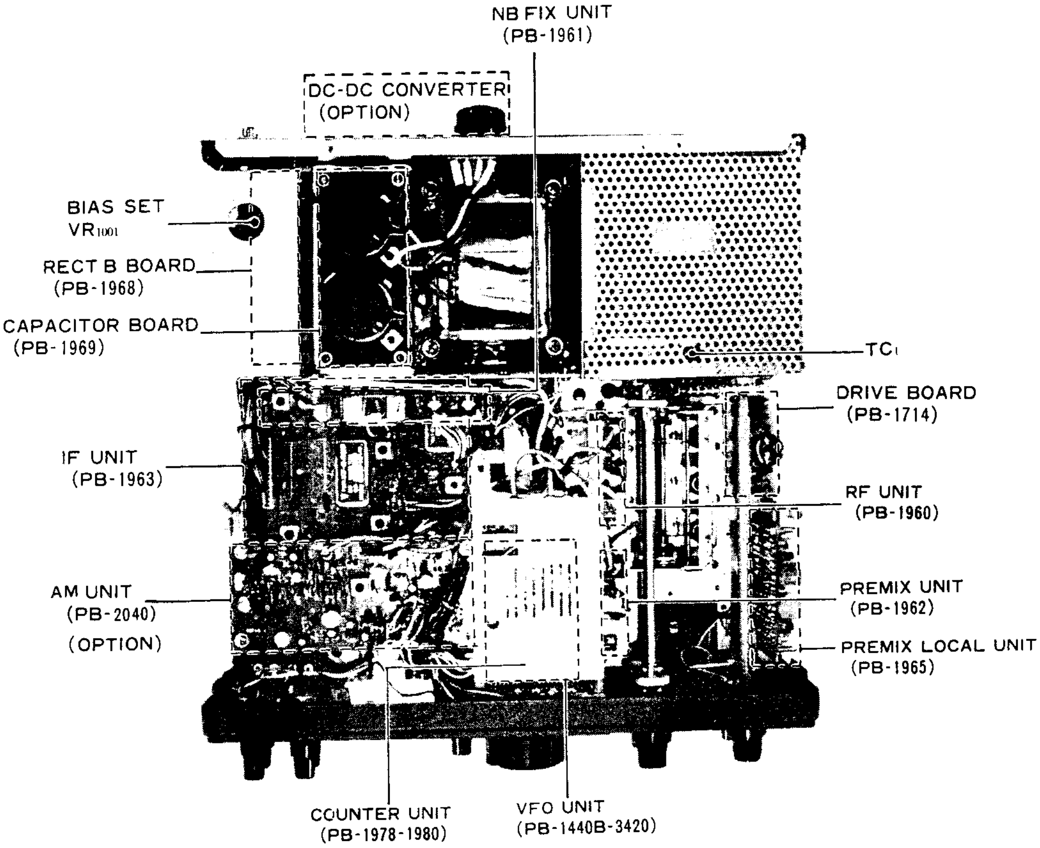


# FRONT PANEL REMOVAL

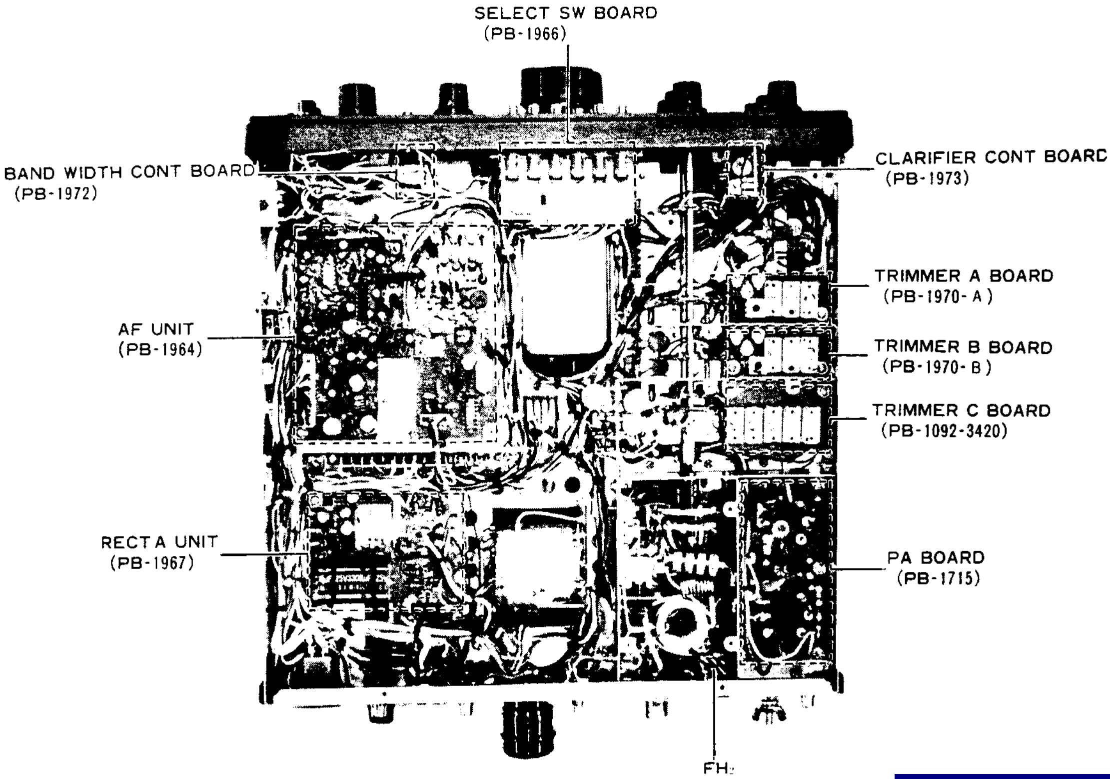


# BOARD LAYOUT

Early model (before Prod. #15)

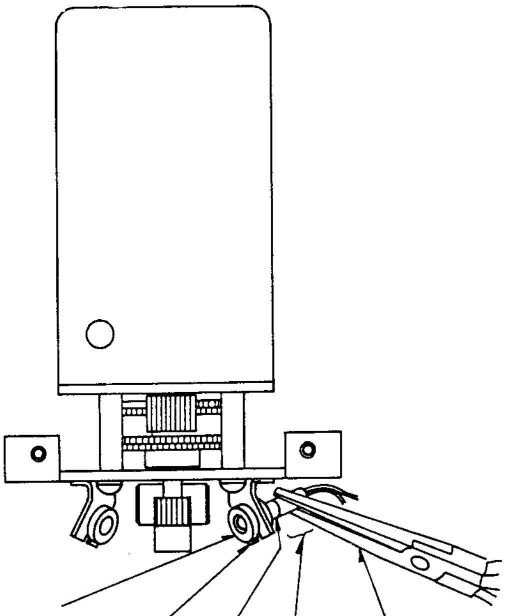



TOP VIEW



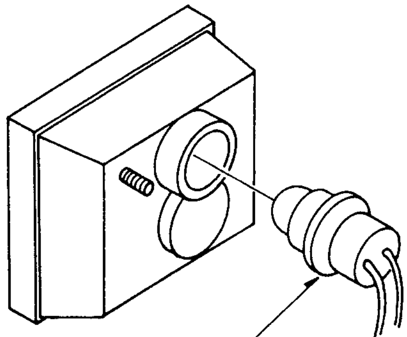

BOTTOM VIEW

# PILOT LIGHT REPLACEMENT




The VFO pilot lamps are easily removed, but a little caution is called for. Carefully grasp the rear portion of the shaft with needle nose pliers and ease the lamp out of its mounting holder.

The pilot lamp for the front panel meter may be removed with your fingers.





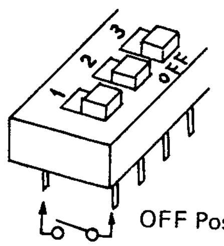

## COUNTER PRESET SWITCH REPLACEMENT

**Early model (before Prod. #15)**

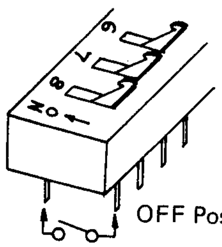
Two types of counter presetting switches are used in the FT-101ZD, and you should take care to install new switches correctly.

The two switches are the DSS208 type (Yaesu part #N7090016) and the A10040-008 type (Yaesu part #66000005). Referring to the drawing, note that when the switch modules are installed so that the numbering is on the same physical side of the switch lever (although reversed in order and upside down), the lever ON/OFF direction will be the same.

Or if you install the switch so that the numbering is in the same direction as the other switch (1-2-3-4-5-6-7-8), the physical direction of the lever action will be reversed.




DSS208
P.N. (N7090016)




A10040-008
P.N. (66000005)

# CW FILTER INSTALLATION(OPTION)

(1) Remove the top cover of the transceiver case, as shown in Fig. 1.

(2) Refer to Fig. 2, and locate the NB-FIX circuit board. Remove its mounting screws, because this board is obstructing the removal of the IF unit.

(3) Remove the 12-pin, 13-pin, and 15-pin plugs from their sockets on the IF unit. Remove the IF unit mounting screws, and remove the IF unit from the transceiver case.

(4) Install the optional CW filter as shown in the foil side view of the IF unit (Fig. 3). Make the fastening nuts snug, and solder the pins of the filter to the circuit board, and remove the 2 jumper wires shown in Figure 3.

(5) Re-install the IF unit, being careful to connect the 12-pin, 13-pin, and 15-pin plugs in the correct sockets. Refer to Fig. 3 to be sure. Re-install the NB-FIX unit, and replace the top cover of the transceiver.

(6) When the optional CW filter is installed, the CW-N position of the mode switch will activate this filter. In the CW-W position, the SSB 2.4 kHz filter will be in use. The WIDTH control is usable in all modes.

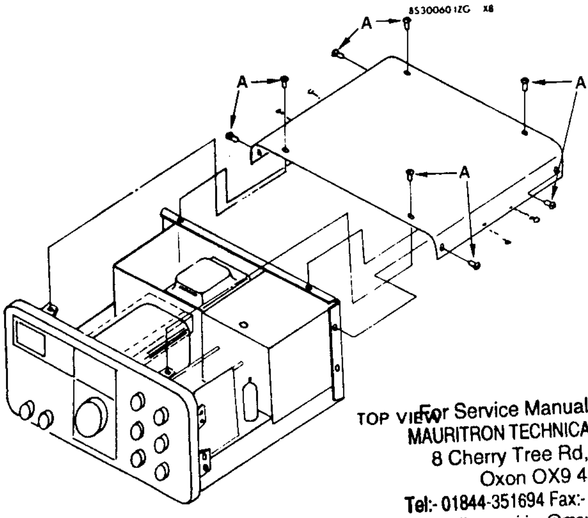





Figure 1

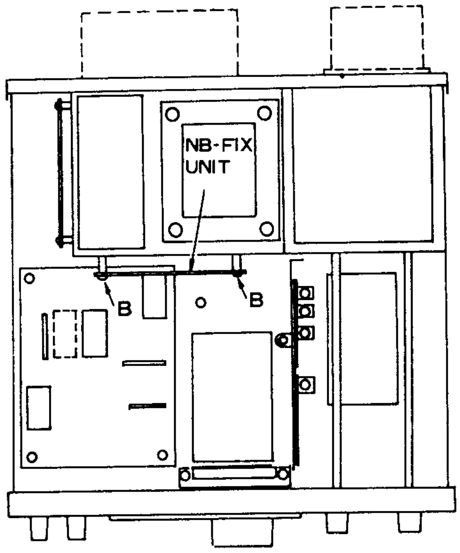



Figure 2

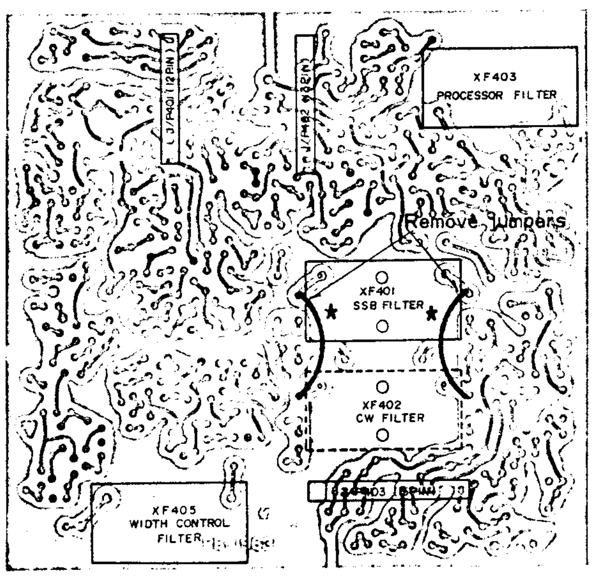



Figure 3

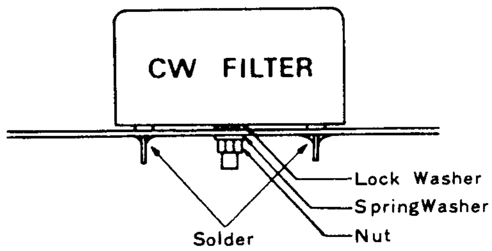



Figure 4

# COUNTER UNIT INSTALLATION ON FT-101Z

Early model (before Prod. #15)

This section will deal with the installation of the COUNTER UNIT and digital display, which are optional equipment for the economy FT-101Z model.

PARTS NEEDED

| | |
|---|---|
| Optical Filter with double-face tape | (1) |
| Counter Module | (1) |
| Guide Pins | (2) |
| Support Tower | (1) |
| Vinyl Tubes | (2) |

(1) Remove the top cover of the transceiver, according to the drawing on page 3-5.

(2) Remove the screws marked "A" in Figure 5. These screws support the LED board.

(3) Remove the screws marked "B" in Figure 5, as well as the tension spring, and remove the analog display panel.

(4) Locate the analog display lamp. Cut the leads to this lamp, insert 1 lead each into the vinyl tube supplied with the counter kit, and position these leads out of the way of the VFO gears, etc.

(5) Install the orange optical filter on the inside of the front panel of the transceiver, in the position formerly occupied by the analog display panel. Be sure that it is correctly centered. The filter is held in place by the double-face tape included with the filter.

(6) Install the two guide pins into the holes previously occupied by the "A" screws. When doing this, install the LED board in its previous position. Install the support tower into the hole marked "C" in Figure 5.

(7) Remove the 820 ohm (Gray-Red-Brown) resistor from the terminal strip marked "E" in Figures 5 and 6.

(8) Install the COUNTER UNIT. The connection to the guide pins should not be forced. Use the screws previously installed at "A" for securing the counter module at points "C" (support) and "D" in Figure 5. Connect the COUNTER UNIT 9-pin plug into the 9-pin socket on the transceiver at point "G" in the drawing. The coaxial cable from the COUNTER UNIT is connected to point "F" in Figure 5.

(9) Close the transceiver. No alignment of the unit is necessary, unless some change in the preset carrier frequencies is required for a special application. In this case, refer to the section on the COUNTER UNIT in the "ALIGNMENT" chapter of this manual.

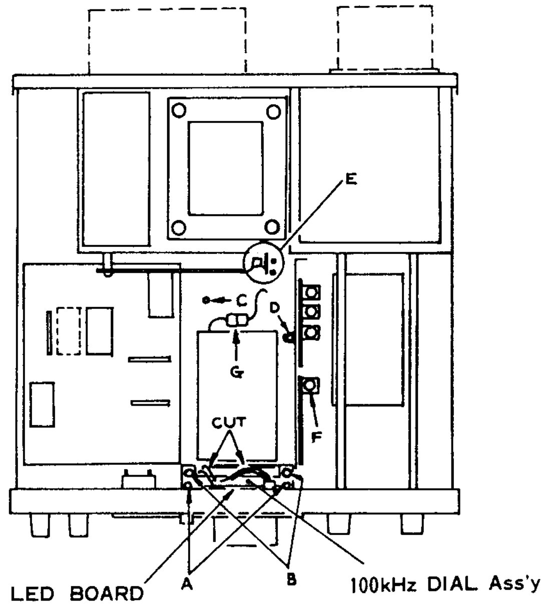
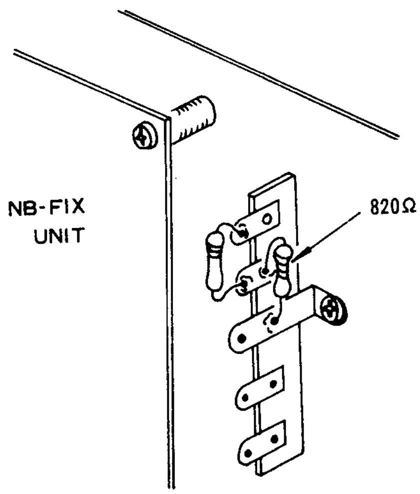



Figure 5.




(Enlarged) Part E

Figure 6.

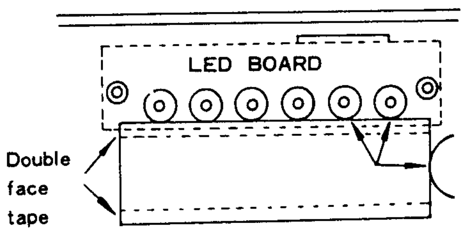



Figure 7.

# FT-101Z/ZD AUX BAND INSTALLATION

**Early model (before Prod. #16)**

The installation of a non-standard frequency band may be accomplished in an hour or two, using the AUX position on the bandswitch. Some alignment is required, but this is not a difficult procedure.

However, please be advised that AUX band installations by someone other than an authorized Yaesu representative will void any warranties in force. As well, Yaesu cannot guarantee that published specifications for operation on the amateur bands will be met during operation on a non-standard band. Of special note are those bands containing, and immediately adjacent to, the IF and VFO frequencies.

The modification process begins with the insertion of the required parts on the PREMIX and PREMIX LOCAL circuit boards, as the AUX band parts were not factory installed. Then the necessary wiring changes are performed, and then the new band is aligned for peak performance on transmit and receive.

## PARTS NEEDED

### For PREMIX UNIT (PB-1962)

Silicon diodes, type 1S1555, 2 ea. ($D_{315}/D_{316}$)
Carbon film resistor, 2.2 K ohms, ¼ watt, 1 ea. ($R_{319}$)
Disc ceramic capacitors, 0.01 μF, 50 WV, 3 ea. ($C_{344}/C_{345}/C_{347}$)
Disc ceramic capacitor, 50 WV, 1 ea. ($C_{346}$ – see Table 6 on page 3-9.)
Micro inductors, 270 μH, 2 ea. ($L_{320}/L_{321}$)
Bandpass coil, see Table 6 on page 3-9 for desired BPF coil among $T_{301}$–$T_{314}$ (for $T_{316}/T_{317}$).

### For PREMIX LOCAL (XTAL) UNIT (PB-1965)

Transistor, type 2SC372Y, 1 ea. ($Q_{611}$)
Silicon diode, type 1S1555, 1 ea. ($D_{611}$)
Carbon film resistor, 56K ohms, ¼ watt, 1 ea. ($R_{644}$)
Carbon film resistor, 18 K ohms, ¼ watt, 1 ea. ($R_{645}$) (28 MHz: 33 K)
Carbon film resistor, 1 K ohm, ¼ watt, 1 ea. ($R_{646}$).
Carbon film resistor, 100 ohms, ¼ watt, 1 ea. ($R_{647}$)
Disc ceramic capacitors, 0.01 μF, 50 WV, 3 ea. ($C_{642}/C_{643}/C_{644}$)
Disc ceramic capacitor, 50 WV, 1 ea. ($C_{645}$ – see Table 6)
Local crystal, 1 ea. ($X_{611}$ – see Table 6)
Oscillator transformer, #220017, 1 ea. ($T_{611}$)

## MODIFICATION PROCEDURE

(1) Refer to Figures 8 and 9, and install the above parts on PB-1962 and PB-1965.

(2) Refer to Figure10, and locate the bandswitch wafers S1B and S1C. Cut the lead from AUX to COMMON, and re-install the lead so as to run from AUX to the post corresponding to column 6 of Table 6, "BAND." For example, for 2.0–2.5 MHz operation, the lead goes from AUX to 160. Do this on both wafers S1B and S1C.

(3) Refer to Figure 4. and install the jumper wire shown, between the AUX terminal and the terminal of the "BAND" column in Table 6, on bandswitch wafer S2D. Note that this is a "double" wafer; S2C is the side facing the front of the transceiver, while S2D is the rear face of this wafer.

(4) Normally, no change in the tank coil tap will be required, as inspection of Table 6 will verify. However, if harmonics or other non-satisfactory transmitter performance characteristics result, use linear interpolation of the values in Table 6, "Tank Coil Tap" column. Note that this will affect the performance in the original amateur band, so beware.

## ALIGNMENT AFTER MODIFICATION

(1) Connect an RF VTVM to pin 1 of $MJ_3$. Adjust $T_{611}$ for maximum indication on the VTVM (Nom. 300 mV).

(2) Temporarily remove the plug from output jack $J_{301}$ of the PREMIX Unit, PB-1962. Connect the RF VTVM to J301. Set the VFO to 250 (band center), and peak the bandpass filter coils for maximum deflection on the VTVM (nom. 100–150 mV). Now check the response from 000 on the VFO to 500. If the response is not flat within 3 dB across the band, retune the bandpass filter coils for a somewhat staggered response.

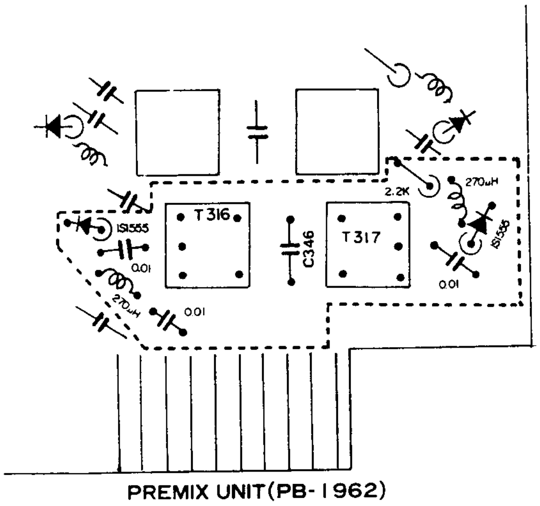



Figure 8.

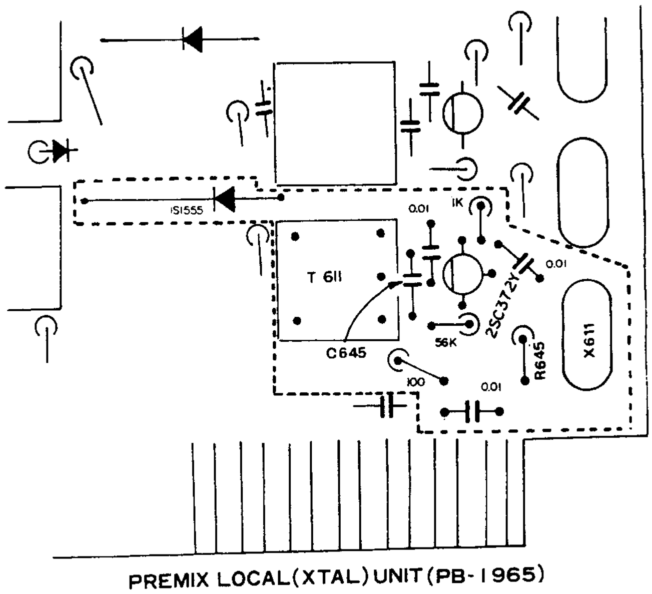
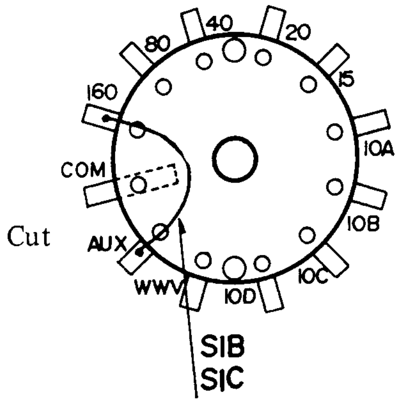



Figure 9




Example for 2.0–2.5 MHz wiring

Figure 10.

Example for 2.0–2.5 MHz wiring

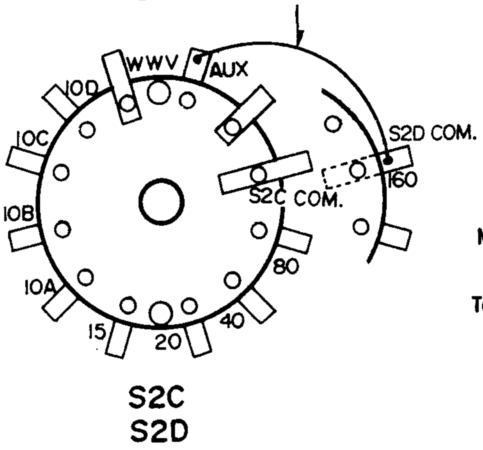



Figure 11.

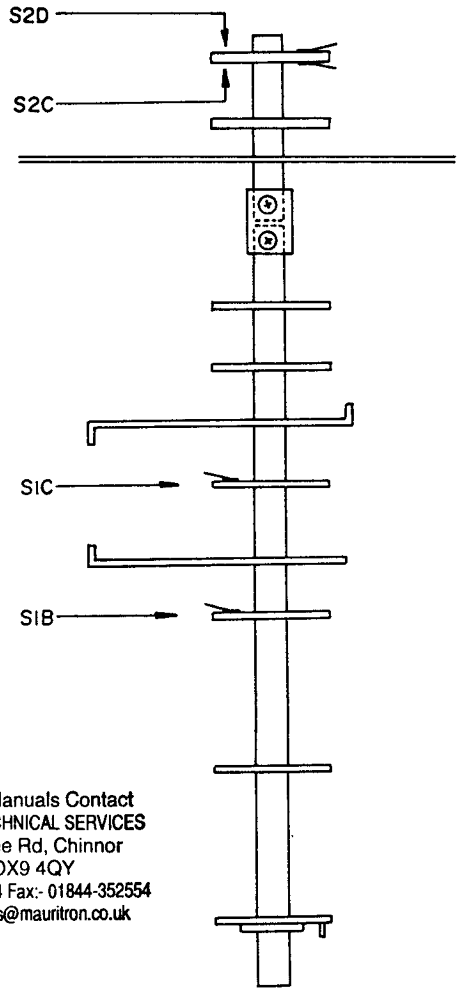



Figure 12.

# FT101Z AUX BAND

| FREQ(MHz) | XTAL(MHz) | OSC CAP(pF) | BPF COIL NUMBER | PREMIX OUT FREQ(MHz) | BAND | PRESELECT | TANK COIL TAP | LOAD CAP(pF) | PLATE CONTROL | LOAD CONTROL | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.8— 2.0 | 15.9875 | 330 | T301,302 | 10.4875—10.9875 | 160 | 0—2.0 | 38 | 3000 | 3.0 | 0 | |
| 2.0— 2.5 | 16.4875 | | T303,304 | 10.9875—11.4875 | 〃 | 2.0—4.5 | | | | | |
| 2.5— 3.0 | 16.9875 | | 〃 | 11.4875—11.9875 | 〃 | 4.5—6.5 | | | | | |
| 3.0— 3.5 | 17.4875 | | 〃 | 11.9875—12.4875 | 80 | 0.5—2.5 | | | | | |
| 3.5— 4.0 | 17.9875 | 270 | 〃 | 12.4875—12.9875 | 〃 | 2.5—4.0 | 26 | 1100 | 2.8 | 0 | |
| 4.0— 4.5 | 18.4875 | | 〃 | 12.9875—13.4875 | 〃 | 4.0—5.5 | | | | | |
| 4.5— 5.0 | 18.9875 | | T313,314 | 13.4875—13.9875 | 40 | 1.2—2.8 | | | | | |
| 5.0— 5.5 | 19.4875 | 240 | 〃 | 13.9875—14.4875 | 〃 | 2.8—3.8 | | | | | ✱(VFO RANGE) |
| 5.5— 6.0 | 19.9875 | | 〃 | 14.4875—14.9875 | 〃 | 3.8—4.8 | | | | | |
| 6.0— 6.5 | 20.4875 | | T305,306 | 14.9875—15.4875 | 〃 | 4.8—5.5 | | | | | |
| 6.5— 7.0 | 20.9875 | | 〃 | 15.4875—15.9875 | 〃 | 5.5—6.0 | | | | | |
| 7.0— 7.5 | 21.4875 | 180 | 〃 | 15.9875—16.4875 | 〃 | 6.0—7.0 | 16 | 620 | 3.9 | 4.5 | |
| 7.5— 8.0 | 21.9875 | | 〃 | 16.4875—16.9875 | 〃 | 7.0—7.5 | | | | | |
| 8.0— 8.5 | 22.4875 | | 〃 | 16.9875—17.4875 | 〃 | 7.5—8.0 | | | | | ✱(IF) |
| 8.5— 9.0 | — | — | — | — | — | — | — | — | — | — | ✱(IF) |
| 9.0— 9.5 | — | — | — | — | — | — | — | — | — | — | ✱(IF) |
| 9.5—10.0 | 23.9875 | | T307,308 | 18.4875—18.9875 | 20 | 4.0—4.7 | | | | | ✱(IF) |
| 10.0—10.5 | 24.4875 | | 〃 | 18.9875—19.4875 | 〃 | 4.7—5.1 | | | | | ✱(IF) |
| 10.5—11.0 | 24.9875 | | 〃 | 19.4875—19.9875 | 〃 | 5.1—5.5 | | | | | ✱(WIDTH IF) |
| 11.0—11.5 | 25.4875 | | 〃 | 19.9875—20.4875 | 〃 | 5.5—6.0 | | | | | |
| 11.5—12.0 | 25.9875 | | 〃 | 20.4875—20.9875 | 〃 | 6.0—6.4 | | | | | |
| 12.0—12.5 | 26.4875 | | 〃 | 20.9875—21.4875 | 〃 | 6.4—6.9 | | | | | |
| 12.5—13.0 | 26.9875 | | 〃 | 21.4875—21.9875 | 〃 | 6.9—7.2 | | | | | |
| 13.0—13.5 | 27.4875 | | 〃 | 21.9875—22.4875 | 〃 | 7.2—7.5 | | | | | |
| 13.5—14.0 | 27.9875 | | 〃 | 22.4875—22.9875 | 〃 | 7.5—7.9 | | | | | |
| 14.0—14.5 | 28.4875 | 100 | 〃 | 22.9875—23.4875 | 〃 | 7.9—8.1 | 10 | 330 | 6.6 | 3.3 | |
| 14.5—15.0 | 28.9875 | | 〃 | 23.4875—23.9875 | 〃 | 8.1—8.3 | | | | | |
| 15.0—15.5 | 29.4875 | | T307,308 | 23.9875—24.4875 | 15 | 5.5—5.8 | | | | | |
| 15.5—16.0 | 29.9875 | | 〃 | 24.4875—24.9875 | 〃 | 5.8—6.0 | | | | | |
| 16.0—16.5 | 30.4875 | | 〃 | 24.9875—25.4875 | 〃 | 6.0—6.3 | | | | | |
| 16.5—17.0 | 30.9875 | | 〃 | 25.4875—25.9875 | 〃 | 6.3—6.7 | | | | | |
| 17.0—17.5 | 31.4875 | | 〃 | 25.9875—26.4875 | 〃 | 6.7—7.0 | | | | | |
| 17.5—18.0 | 31.9875 | | T309,310 | 26.4875—26.9875 | 〃 | 7.0—7.2 | | | | | ✱(IF HARMONIC) |
| 18.0—18.5 | 32.4875 | | 〃 | 26.9875—27.4875 | 〃 | 7.2—7.4 | | | | | ✱( 〃 ) |
| 18.5—19.0 | 32.9875 | | 〃 | 27.4875—27.9875 | 〃 | 7.4—7.6 | | | | | ✱( 〃 ) |
| 19.0—19.5 | 33.4875 | | 〃 | 27.9875—28.4875 | 〃 | 7.6—7.8 | | | | | |
| 19.5—20.0 | 33.9875 | | 〃 | 28.4875—28.9875 | 〃 | 7.8—8.0 | | | | | ✱(WIDTH CARRIER) |
| 20.0—20.5 | 34.4875 | | 〃 | 28.9875—29.4875 | 〃 | 8.0—8.3 | | | | | |
| 20.5—21.0 | 34.9875 | | 〃 | 29.4875—29.9875 | 〃 | 8.3—8.5 | | | | | |
| 21.0—21.5 | 35.4875 | 68 | 〃 | 29.9875—30.4875 | 〃 | 8.5—8.7 | 7 | — | 7.5 | 2.0 | |
| 21.5—22.0 | 35.9875 | | 〃 | 30.4875—30.9875 | 〃 | 8.7—9.0 | | | | | |
| 22.0—22.5 | 36.4875 | | 〃 | 30.9875—31.4875 | 10 | 7.0—7.3 | | | | | |
| 22.5—23.0 | 36.9875 | | 〃 | 31.4875—31.9875 | 〃 | 7.3—7.5 | | | | | |
| 23.0—23.5 | 37.4875 | | 〃 | 31.9875—32.4875 | 〃 | 7.5—7.6 | | | | | |
| 23.5—24.0 | 37.9875 | | T311,312 | 32.4875—32.9875 | 〃 | 7.6—7.8 | | | | | |
| 24.0—24.5 | 38.4875 | | 〃 | 32.9875—33.4875 | 〃 | 7.8—8.0 | | | | | |
| 24.5—25.0 | 38.9875 | | 〃 | 33.4875—33.9875 | 〃 | 8.0—8.2 | | | | | |
| 25.0—25.5 | 39.4875 | | 〃 | 33.9875—34.4875 | 〃 | 8.2—8.3 | | | | | |
| 25.5—26.0 | 39.9875 | | 〃 | 34.4875—34.9875 | 〃 | 8.3—8.4 | | | | | |
| 26.0—26.5 | 40.4875 | | 〃 | 34.9875—35.4875 | 〃 | 8.4—8.6 | | | | | |
| 28.0—28.5 | 42.4875 | 47 | 〃 | 36.9875—37.4875 | 〃 | 9.0—9.2 | 5 | | 8.1 | 1.5 | |
| 28.5—29.0 | 42.9875 | 47 | 〃 | 37.4875—37.9875 | 〃 | 9.2—9.4 | 5 | | 8.2 | 1.5 | |
| 29.0—29.5 | 43.4875 | 47 | 〃 | 37.9875—38.4875 | 〃 | 9.4—9.6 | 5 | | 8.5 | 1.5 | |
| 29.5—30.0 | 43.9875 | 47 | 〃 | 38.4875—38.9875 | 〃 | 9.6—9.8 | 5 | | 8.8 | 1.7 | |

Table 6

✱ QUESTIONABLE PERFORMANCE
(Modifications to be provided for possible WARC expansion at 10 and 18 MHz)

## DC-DC CONVERTER INSTALLATION (OPTION) Early model (before Prod. #23)

The optional DC-DC converter is easy to install in a matter of minutes. Please follow the instructions carefully, in order to make the proper connections.

(1) Install the DC-DC converter module as shown in the drawing. Use the four screws supplied with the kit. Do not force the plug into the socket, as the connection should be smooth, yet solid.

(2) Check the DC cable fuse socket, located in the positive (red) lead, to be certain that a 20 amp fuse is installed.

(3) When making connections to the battery, be absolutely certain that the proper polarity is observed. The RED lead should be connected to the POSITIVE (+) battery terminal, and the BLACK lead should be connected to the NEGATIVE (–) terminal. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY REVERSED POLARITY CONNECTIONS.

(4) Before connecting the DC power cable to the transceiver, check the automobile voltage regulator level with the engine running (battery charging). The maximum charging rate should be 15 volts or less. If the voltage is higher than this level, please adjust the voltage regulator for a maximum of 15 volts. This precaution applies, as well, to bench power supplies, which should be adjusted in the same fashion. Also, the transceiver should not be operated from a supply voltage of less than 12 volts.

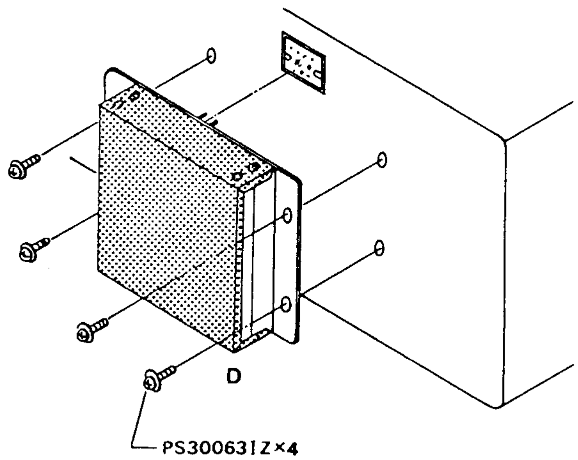
(5) Connect the DC cable to the transceiver. Power connections are made automatically when the DC cable is connected to the POWER jack.

## NOTES ON MOBILE INSTALLATION

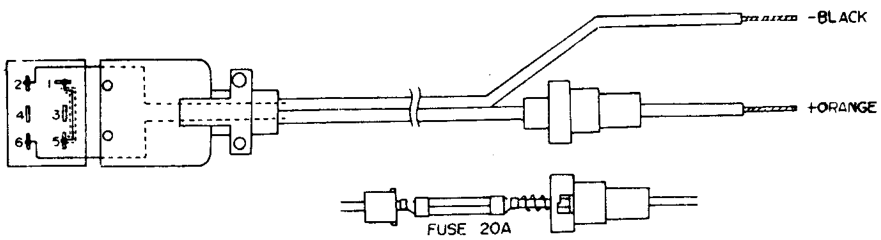
Be certain that sufficient room is provided for free air circulation around the transceiver. If the transceiver must be placed on the car seat, set it on a board or other rigid object, in order to provide the necessary air circulation (and to avoid possible heat damage to the uphoulstery.

A special mobile mounting bracket is available from your YAESU dealer.

The DC supply should be capable of providing 20 amps on voice peaks, 14 amps continuous. The HEATER switch may be turned off during long periods of reception, for energy conservation.





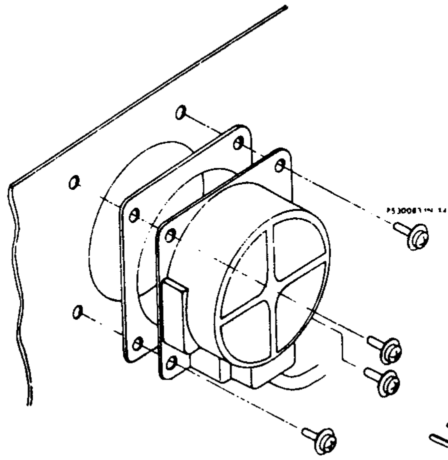



## COOLING FAN INSTALLATION (OPTION)

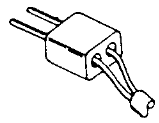
The FT-101ZD cooling fan may be used with other models of Yaesu equipment. Installation is easily accomplished in minutes.

Hold the fan up to the rear panel in its proper location. Determine the proper length of the two-wire power lead to the motor. Solder the leads to the 2-pin plug supplied with the fan. The 4-pin plug is not needed for FT-101ZD installation.

Install the fan onto the rear panel of the transceiver, as shown in the drawing. Insert the power lead from the fan into the fan socket on the rear panel.

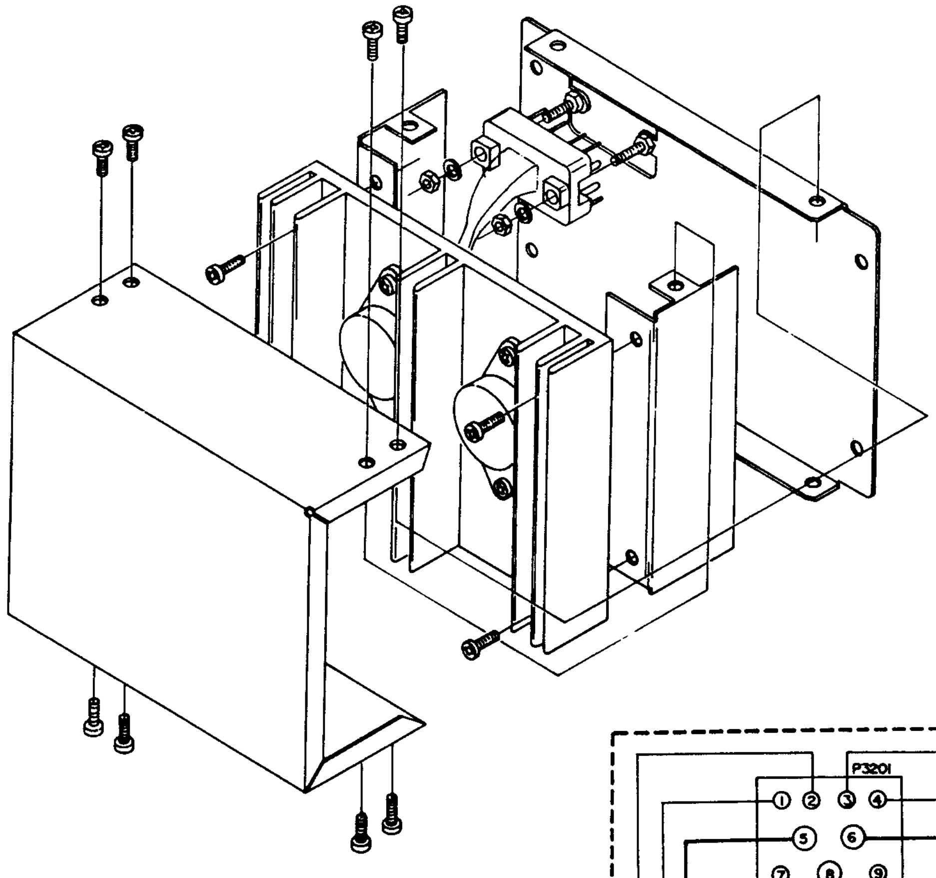


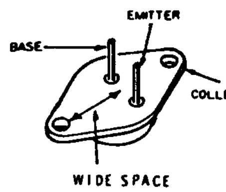
Cooling fan

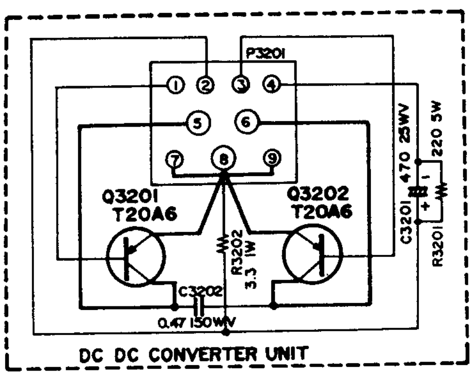


Fan plug

## DC-DC CONVERTER (EXPLODED VIEW)





## SOLDERING AND DESOLDERING TECHNIQUE ON PRINTED CIRCUIT BOARDS

The FT-101Z circuit boards are tough, but mishandling during soldering can cause circuit traces to "lift". While this does not cause permanent damage to the board, much servicing trouble can result, because of the tendency for this lifted trace to break. A few simple precautions will keep your circuit boards in A-1 condition.

1. Use only a 12 to 30 watt chisel-tip soldering iron. Yes, some "repairmen" have been known to use small blowtorches on cards.

2. Use only a soldering iron equipped with a three-wire cord, with the tip grounded. Also acceptable is a soldering iron isolated through a transformer. An old soldering iron or gun may have 117 volts on the tip, and will certainly cause more damage than it repairs!

3. USE ONLY 60/40 ROSIN CORE SOLDER. Acid core solder should be thrown away if you find it in your radio shop!

4. Use a solder sucker and solder tape to ensure a professional repair job.

5. If you **do** lift a trace, don't worry! Read on to find out how to repair traces like a pro.

## NOTES ON USE OF CMOS IC's:

As CMOS devices are extremely sensitive to damage from static electricity, special precautions must be observed.

In storage, use only sponge specially designed for CMOS components.

When installing a CMOS IC in a socket, or on a circuit board, be certain that the power is off. In addition, the technician should rest his hand on the chassis as the component is inserted, so as to place his hand at the same potential as the chassis (better to discharge small amounts of static electricity through your fingers than through a $5 IC !).

When soldering a CMOS IC onto a circuit board, use a low wattage iron, and be sure to ground the tip with a clip lead, if the tip is not grounded through a three-wire power cord.



# INSERTION OF PARTS ON CIRCUIT BOARDS

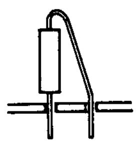
All of the below are acceptable ways of inserting components into circuit board mounting holes.



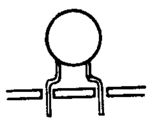
(a) Bend leads slightly



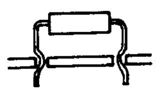
(b) Straight-in mounting



(c) Vertical mounting

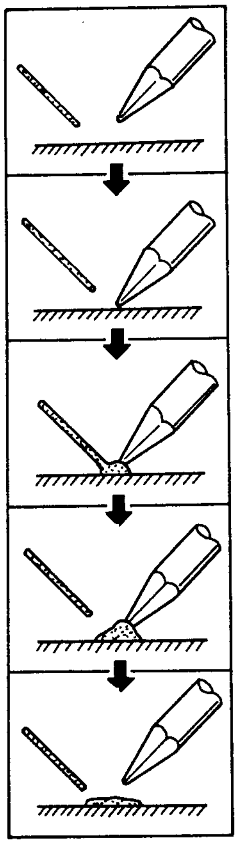


(d) Preformed disc ceramic capacitor



(e) Preformed resistor, diode, etc.

## BASIC SOLDERING PRACTICE



(1) Prepare soldering iron and solder.

(2) Apply soldering iron to surface to be soldered.

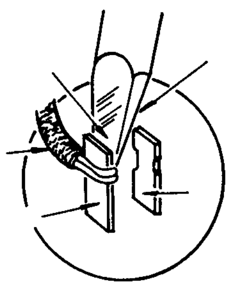
(3) Apply solder to heated surface.

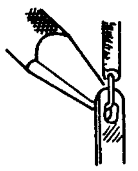
(4) When enough solder is applied, remove solder. Continue to apply heat until solder flows cleanly.

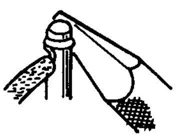
(5) Remove iron from work. Do not apply more heat than necessary for good solder flow.

**Soldering to terminal posts:**

(Be certain to apply heat to both post and wire.)

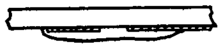




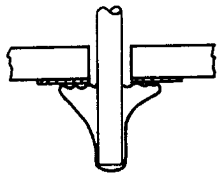


## EXAMPLES OF POOR SOLDERING PRACTICE

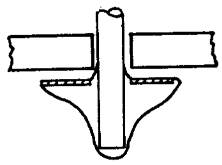
Solder bridge (caused by use of too much solder)



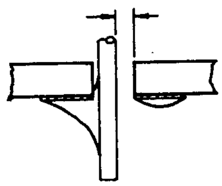
"Cold joint" (caused by insufficient heat to part of work, resulting in poor solder flow)



Lifted trace (caused by too much heat on circuit board foil)

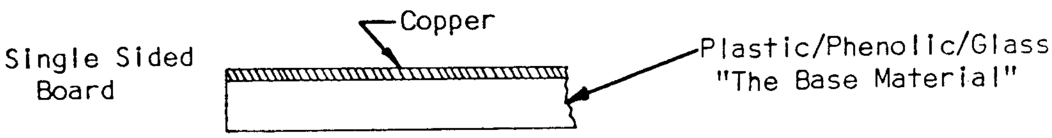


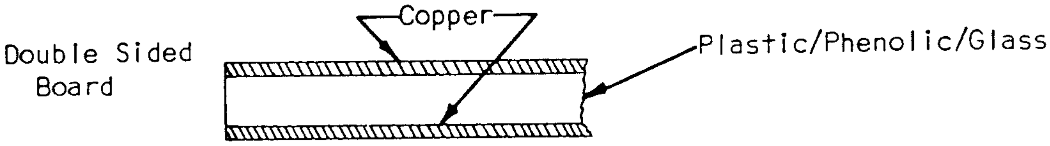
Unstable joint (caused by insufficient heat or solder)

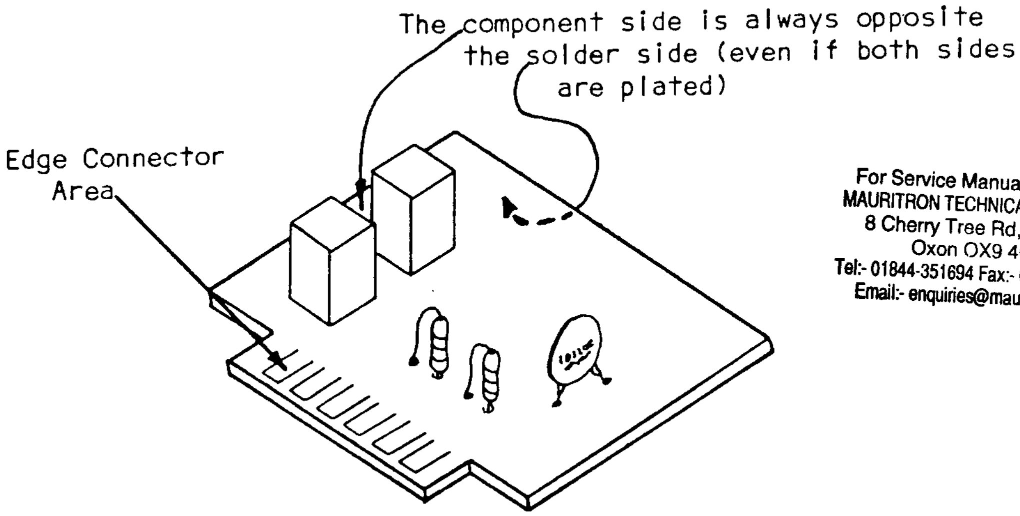


# CIRCUIT TRACE REPAIR

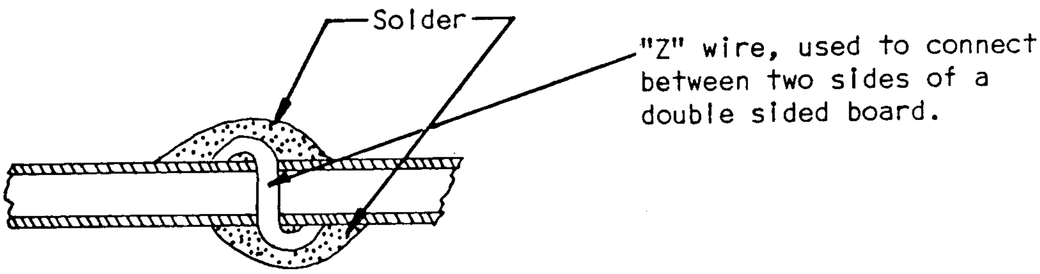
Most of the printed circuit boards used in the FT-101Zare single sided boards. However, occasionally a double-sided board is used, in situations where high shielding is required. A comparison of the two types is shown below.



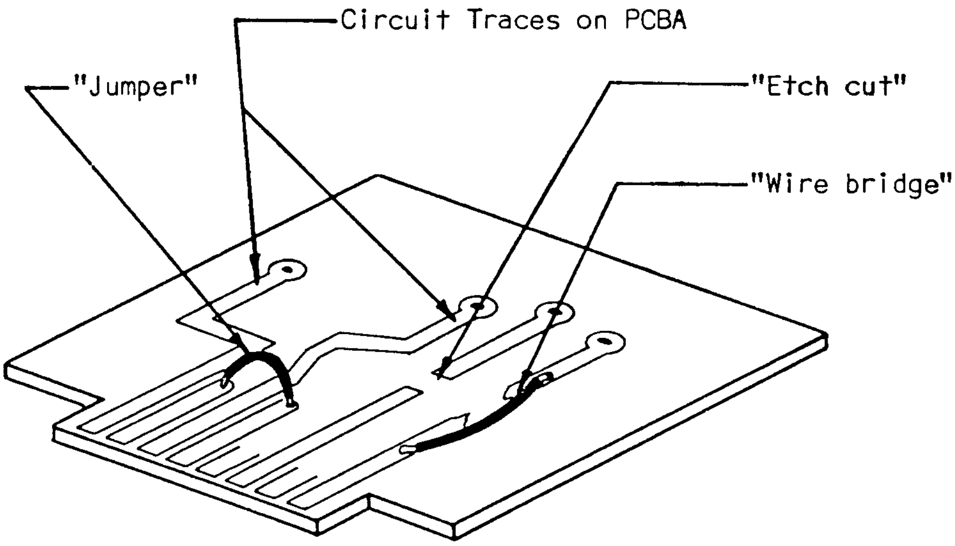



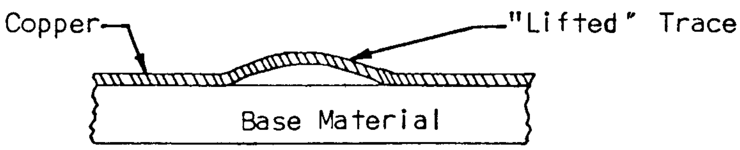


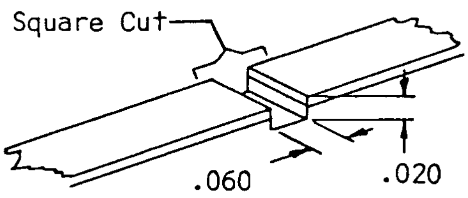
Sometimes, after the design and drafting of a board are completed, a board is produced with an error in it. Though non-technical managers sometimes suffer a stroke at hearing of this situation, it is not unheard of in engineering circles. Thus, should you encounter etch cuts and jumpers on a board, be assured that the modifications were made in the interest of securing optimum performance. Unless you consider your expertise to be superior to that of the design engineer, please leave these mods in place.

However, in service work the occasion does arise when a trace must be cut. Proceed as follows.




If you have previously lifted a trace, make an etch cut on each side of the lifted trace, and install a wire bridge as shown in the drawing.




Coat Cut Area With Eastman 910

# MODIFICATIONS

## MODIFICATION OF FV-901DM FOR USE WITH FT-101ZD

The tuning dial for the FT-101ZD turns in reversed sense with respect to the FV-901DM synthesized scanning VFO main dial. If it is desired to have both dials rotate in the same direction for a given change in frequency, the modification below will allow this facility. It should be noted that this modification is not required to achieve full functioning of the FV-901DM; however, clockwise rotation of the FV-901DM will correspond with counterclockwise rotation of the FT-101ZD dial.

**Modification Procedure:**

(1) Remove the top and bottom covers of the FV-901DM, removing the screws as shown in Figure 13.

(2) Locate PB-1848 and PB-1849, which can be seen at "A" in Figure 14.

(3) Referring to Figure 15, locate the white/green wire connected between pin 4 of $P_1$ and PB-1848; also locate the green wire connected between pin 5 of $P_1$ and PB-1849. Reverse these wires by unsoldering them from the circuit boards and installing the green wire to PB-1848, the white/green wire to PB-1849. The corrected schematic is shown in Figure 16.

(4) Locate the CLARIFIER potentiometer inside the front panel of the case. Refer to Figure 17, and locate the yellow and green wires, as well as the 1.5 K ohm resistor. Rewire the connections as shown in Figure 18 for proper CLARIFIER operation. Modification is now complete.

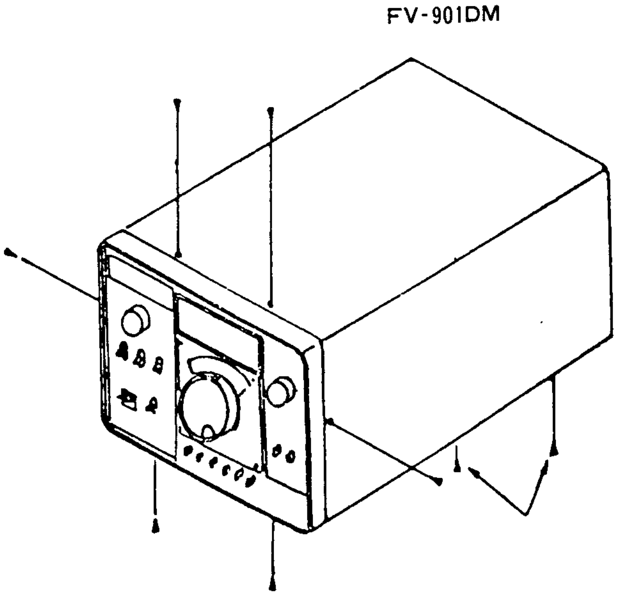



Figure 13.

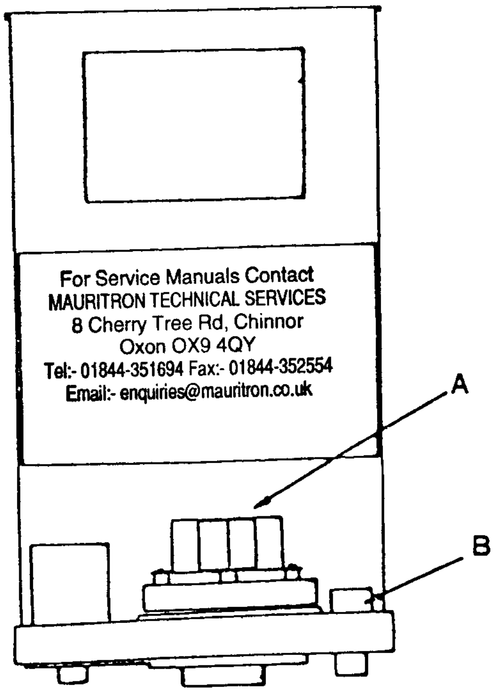



Figure 14

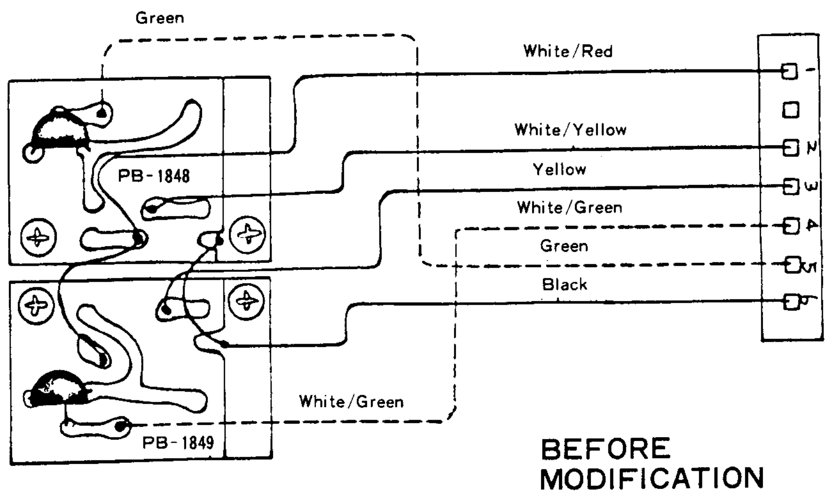



Figure 15.

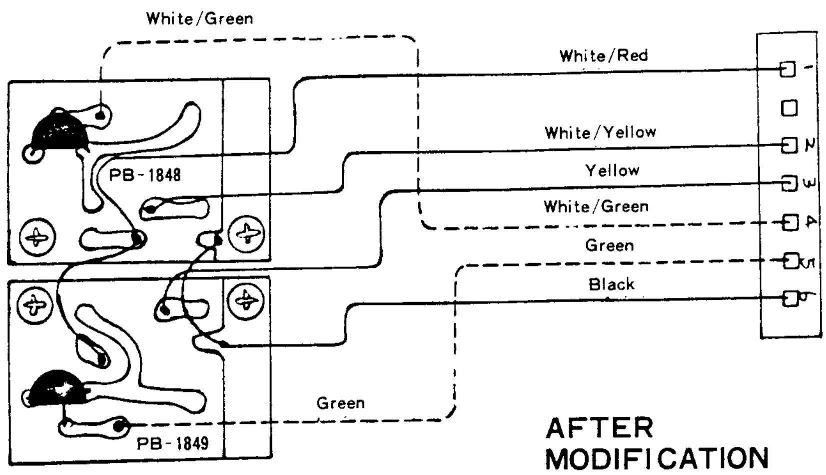



Figure 16.

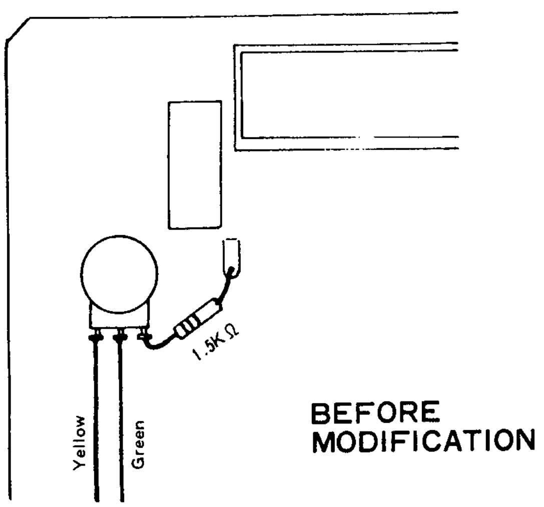



Figure 17.

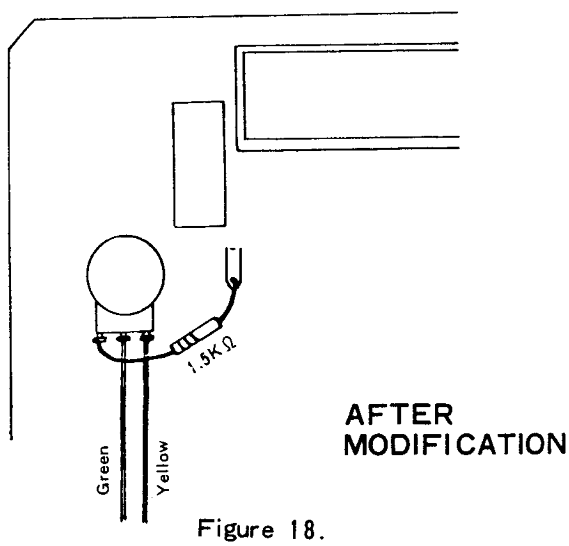



Figure 18.

# RECTIFIER B UNIT MODIFICATIONS

In order to provide additional protection for the power supply circuitry, several changes were adopted in the RECTIFIER B Unit circuit. At A in the schematics is the circuit used for production lots 1 through 4. At B is the circuit modification used for production lots 5 and 6. The modification procedure is described below.

(1) Add a 270 k ohm, ½ watt resistor in parallel with each of the following: $R_{1001}$, $R_{1002}$, $R_{1003}$, and $R_{1004}$.
Alternatively, you may change each of the above resistors to a value of 180 k ohms, ½ watt.

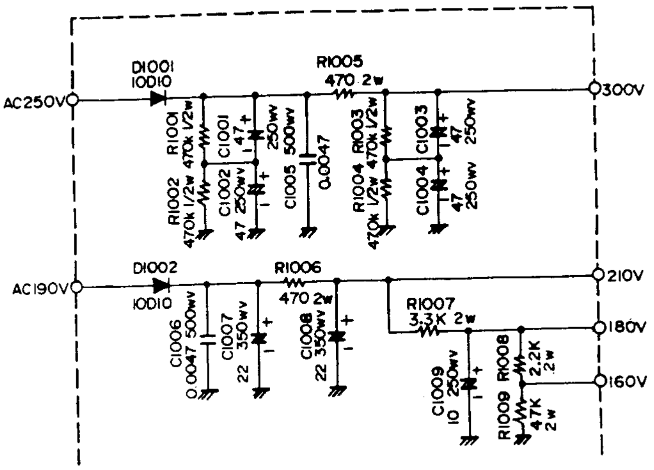
(2) Change $R_{1005}$ to 390 ohms, 2 watts.

(3) Add a new $R_{1022}$ (39 ohms, 1 watt) in series with $D_{1001}$, as shown.

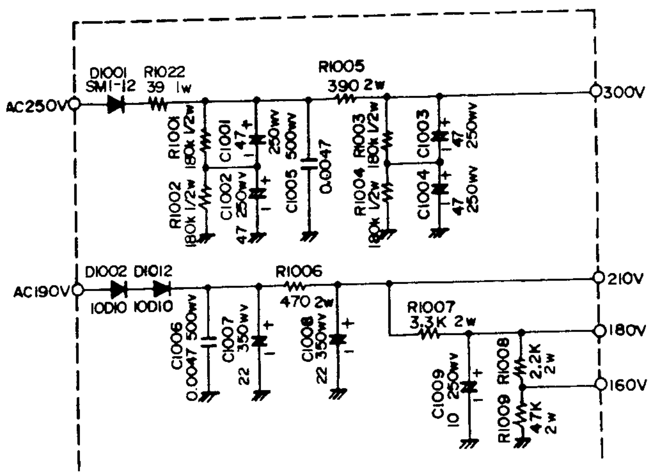
(4) Add a new 10D10 diode in series with $D_{1002}$.

(5) $D_{1001}$ is being changed in production to type SM1−12, but field modification is not required.

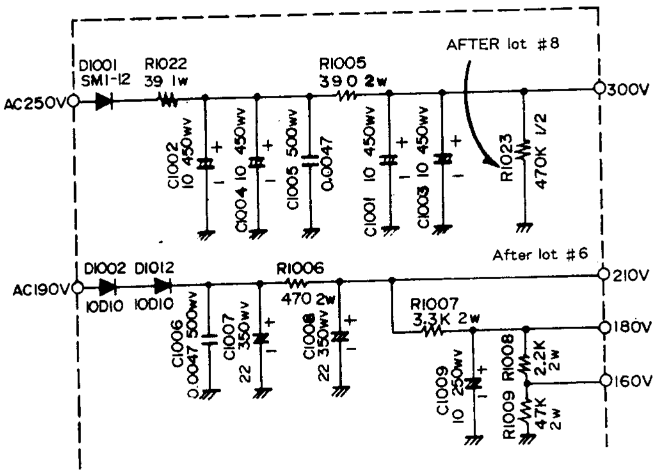
Beginning with production lot 6, the circuit was consolidated. The circuit used after lot 6 is shown at C, with the following exception: $R_{1023}$ was not installed in lots 6 and 7, and we recommend that it be installed in the field the next time you perform service. The purpose of $R_{1023}$ is to provide a bleeder path for the filter capacitors.




A: BEFORE MODIFICATION

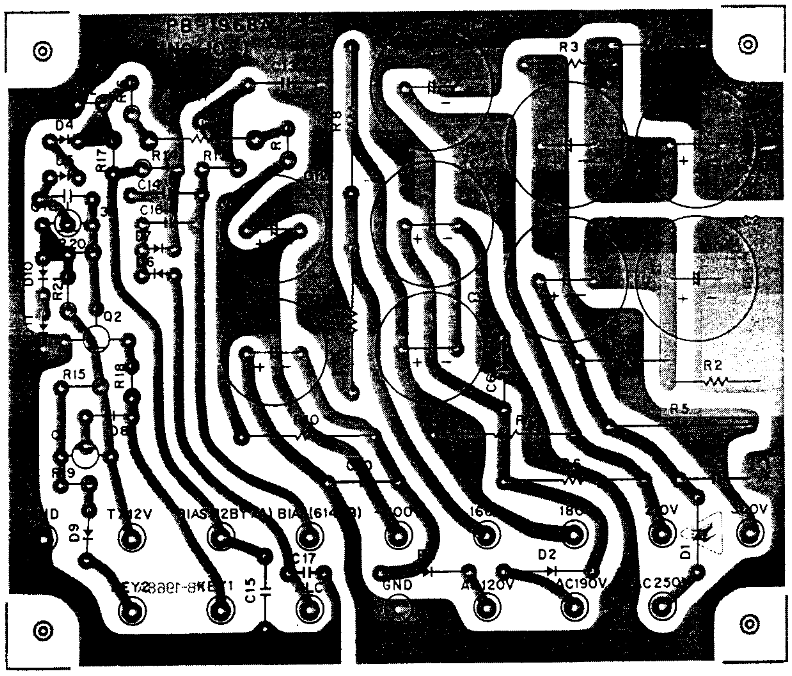


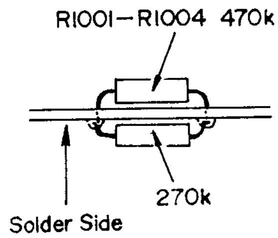

B: AFTER MODIFICATION



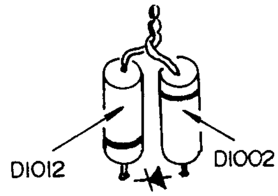

C: AFTER LOT ≠6

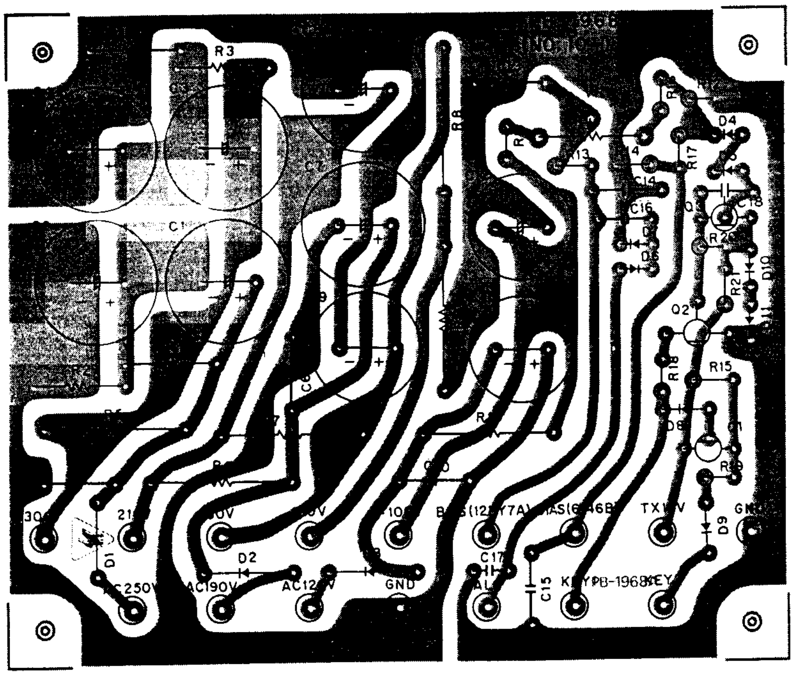
# RECT B UNIT PARTS LAYOUT

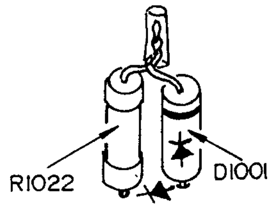



Viewed from component side



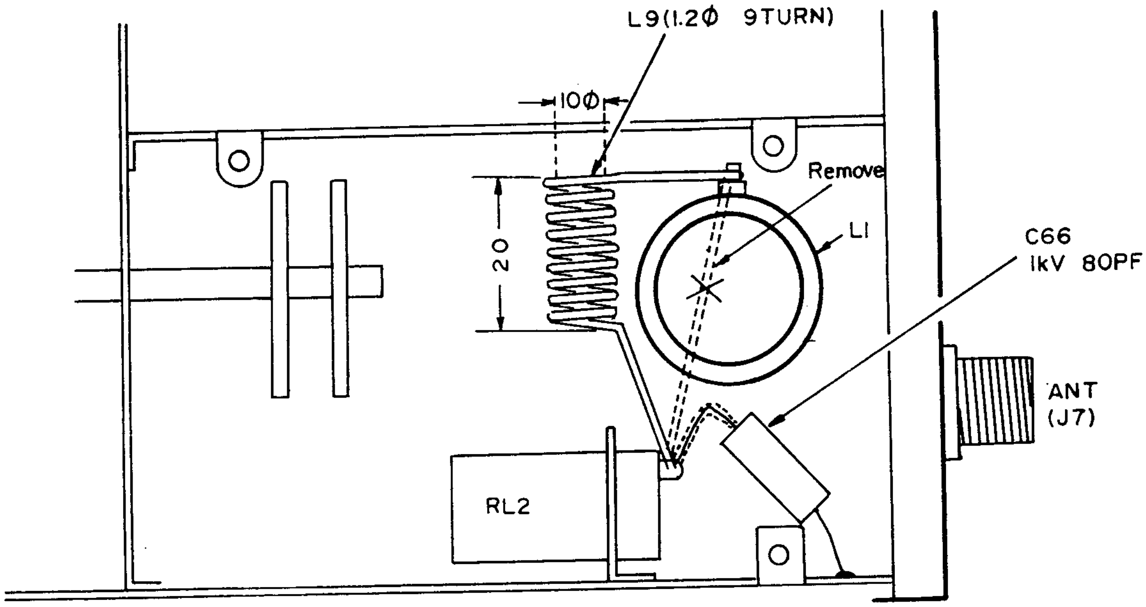



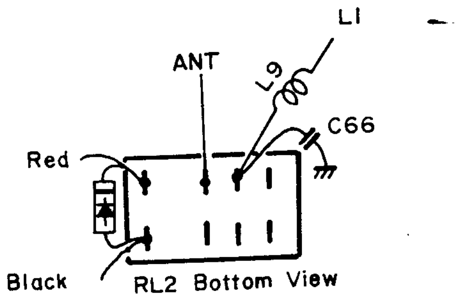



Viewed from solder side

# LOW-PASS FILTER ADDITION

The FT-101Z and FT-101ZD transceivers were modified, beginning with the production lot #04, with the inclusion of the low-pass filter circuit shown below. The parts to be added are $L_9$ (0.4μH) and $C_{66}$ (mica, 80 pF, 1 kV). The drawing below is an underside view, showing the correct installation.



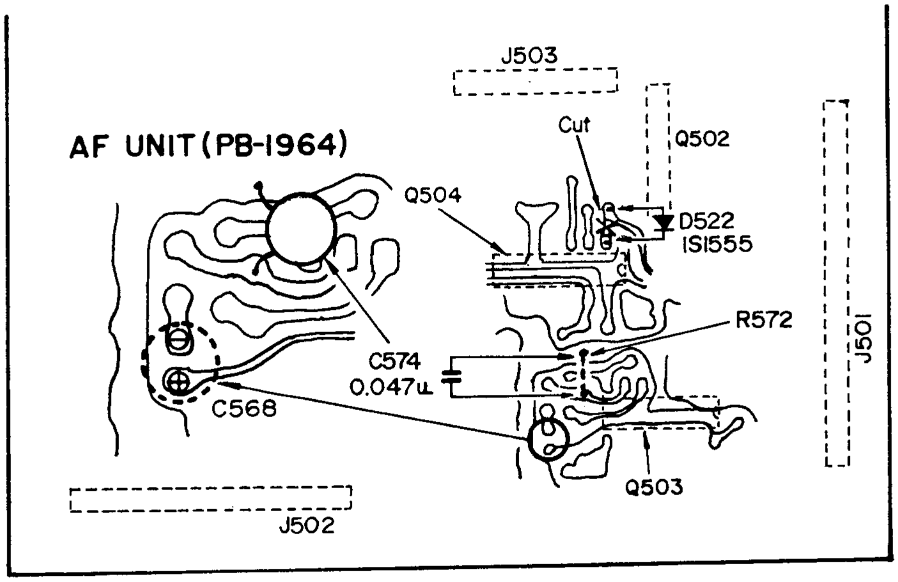
# VOX CIRCUIT MODIFICATION

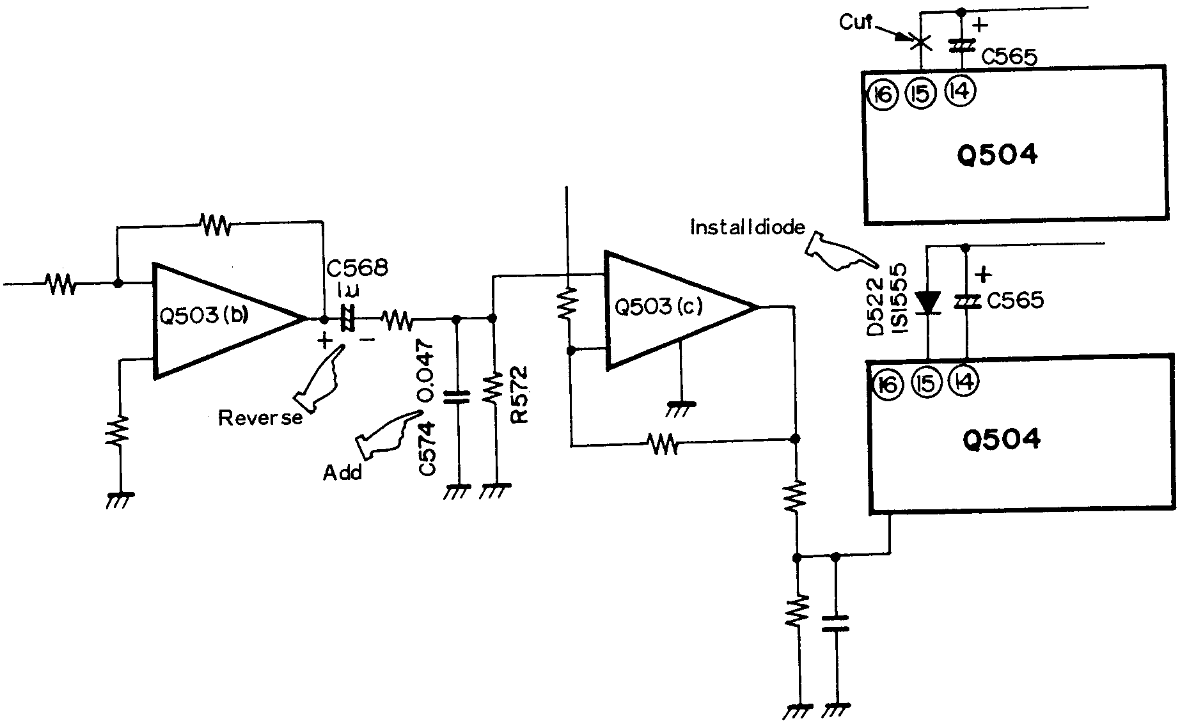
In order to ensure reliable VOX operation, the following modifications were adopted as of production lot number 7, and may be of help if you have a problem with inconsistent VOX timing.

(1) Cut the lead to pin 15 of $Q_{504}$. Install a silicon switching diode (1S1555) in its place, as shown in the drawing.

(2) Add a new disc ceramic capacitor ($C_{574}$), 0.047 $\mu$F, in parallel with $R_{572}$.

(3) Reverse the polarity of $C_{568}$, as it was installed in reverse order for the intended purpose. The correct installation is shown in the drawing, and a new capacitor is probably called for. See also page 3-25.



# COUNTER CIRCUIT MODIFICATIONS

In order to eliminate an occasional low-level counter beat, the following modifications may be of help.

(1) In sets from production lots 1 through 4:

(a) Solder a three-pin (one grounded) solder lug to the Counter Support Board, as shown in Figure 19.

(b) Solder new $C_{68}$ (0.047 $\mu$F) and $C_{69}$ (0.047 $\mu$F) disc ceramic capacitors, as well as the new $C_{70}$ electrolytic (10 $\mu$F) to the terminal, per the schematic.

(2) In sets from production lots 1 through 5:

(a) Install the three bypass capacitors $C_{2324}$, $C_{2325}$, and $C_{2326}$ from the CW, USB, and LSB terminals of the COUNTER MAIN BOARD, respectively, to ground. Refer also to the schematic for details (these are shown installed in the schematic on page 2-17).



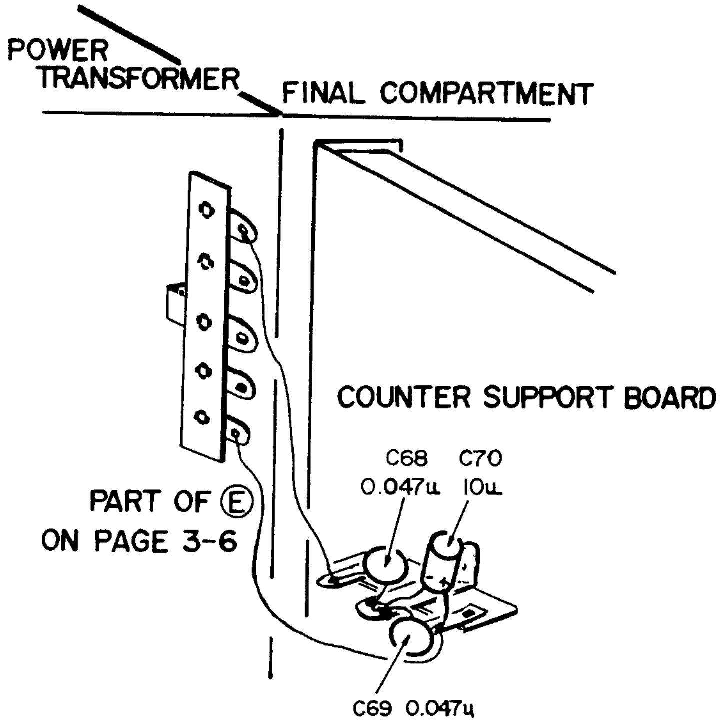
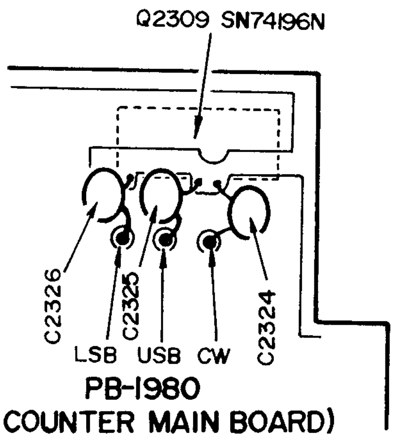



Figure 19.




(C2324/2325/2326 0.047$\mu$f)

Figure 20

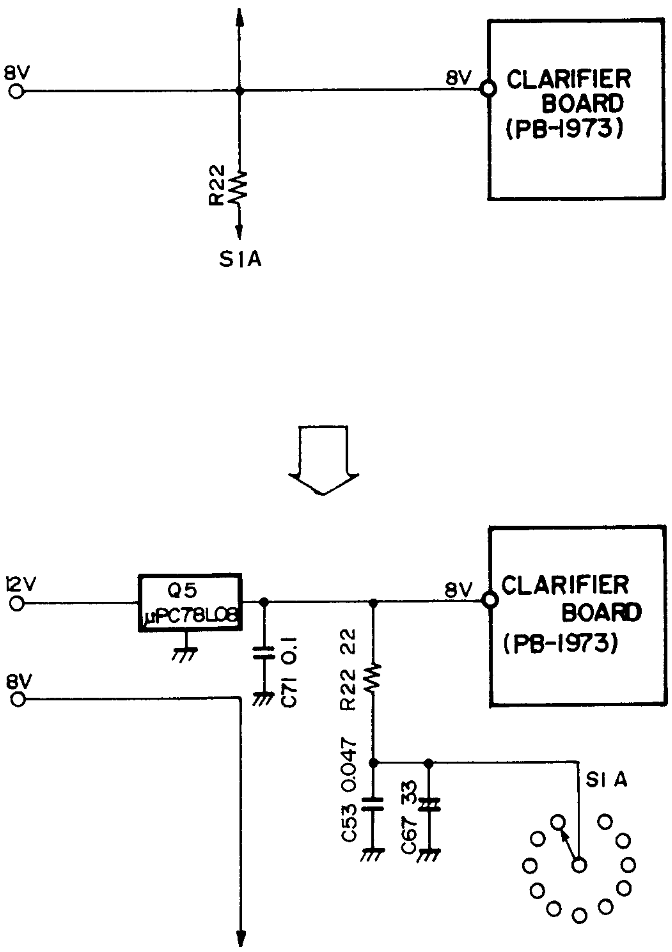
# VFO DRIFT IN CONJUNCTION WITH DIMMER CONTROL

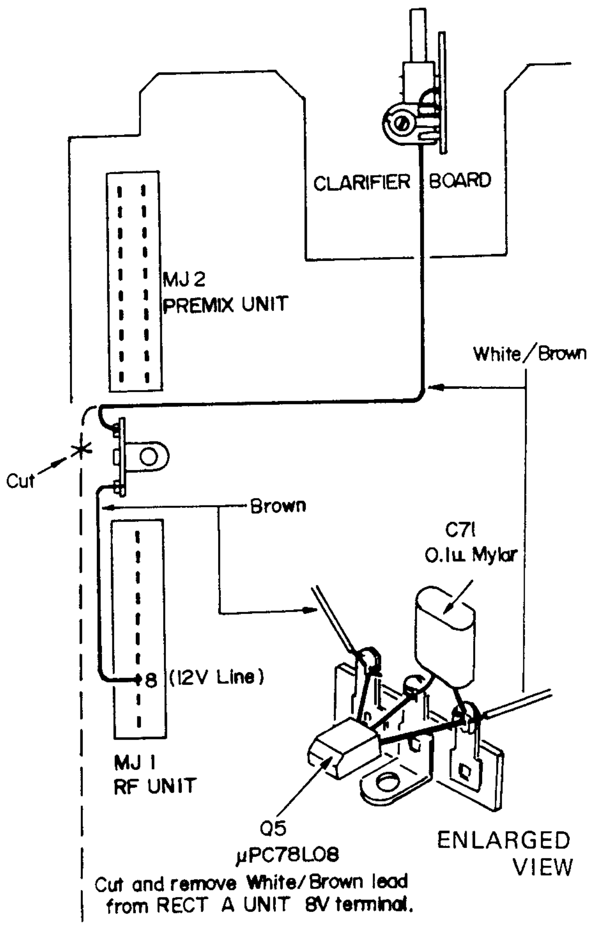
Some FT-101ZD transceivers from the first 6 production lots displayed a slight drift of the VFO when the dimmer control was rotated. In order to clear up this problem, the 8 volt line for the clarifier board was separated from the other 8 volt lines, and the following section will describe the correct procedure.

(1) Locate the white/brown lead between the CLARIFIER board and the 8 V terminal on the RECT A Unit. Cut this lead at the RECT A Unit.

(2) Install a three-pin (one grounded) terminal strip adjacent to $MJ_1$, one the bottom side of the chassis, as shown in the drawing. Connect the white/brown wire to one side, and install the $\mu$PC78L08 regulator so that the output side is connected to the white/brown wire. Then install the 0.1 $\mu$F mylar capacitor as shown, and connect the input side of the $\mu$PC78L08 to the (brown) wire shown. The other end of the brown wire connects to pin 8 of $MJ_1$, the 12 volt line terminal.

(3) A comparison of the old and new circuits is shown below.



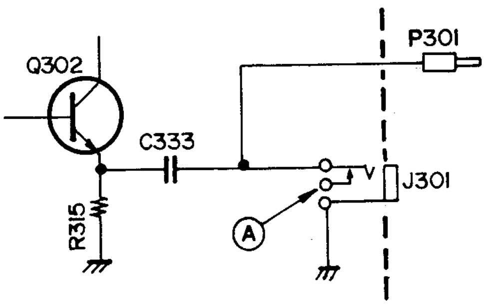
# 21.2 MHz SPURIOUS SUPPRESSION ON FT-101Z(ANALOG DIAL)

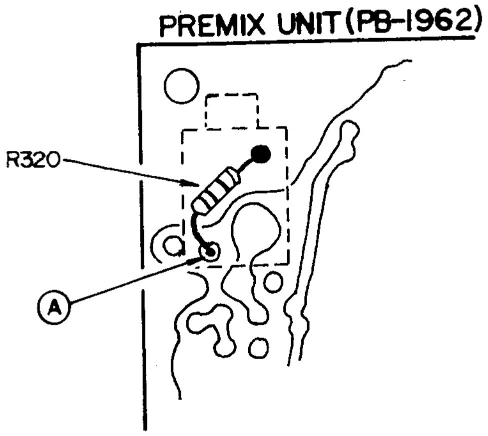
On the analog FT-101Z, a lingering spurious signal could sometimes be heard at 21.2 MHz. With the counter unit installed, the beat is inaudible, and the following modification will eliminate this weak spur in analog versions.

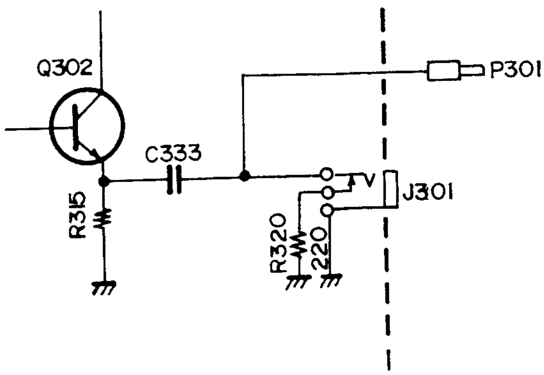
Refer to the drawing below, and install a new 220 ohm ¼ watt resistor (R320) on the PREMIX Unit as shown.

No further modification is required.





# AF UNIT CAPACITOR POLARITY CHECK

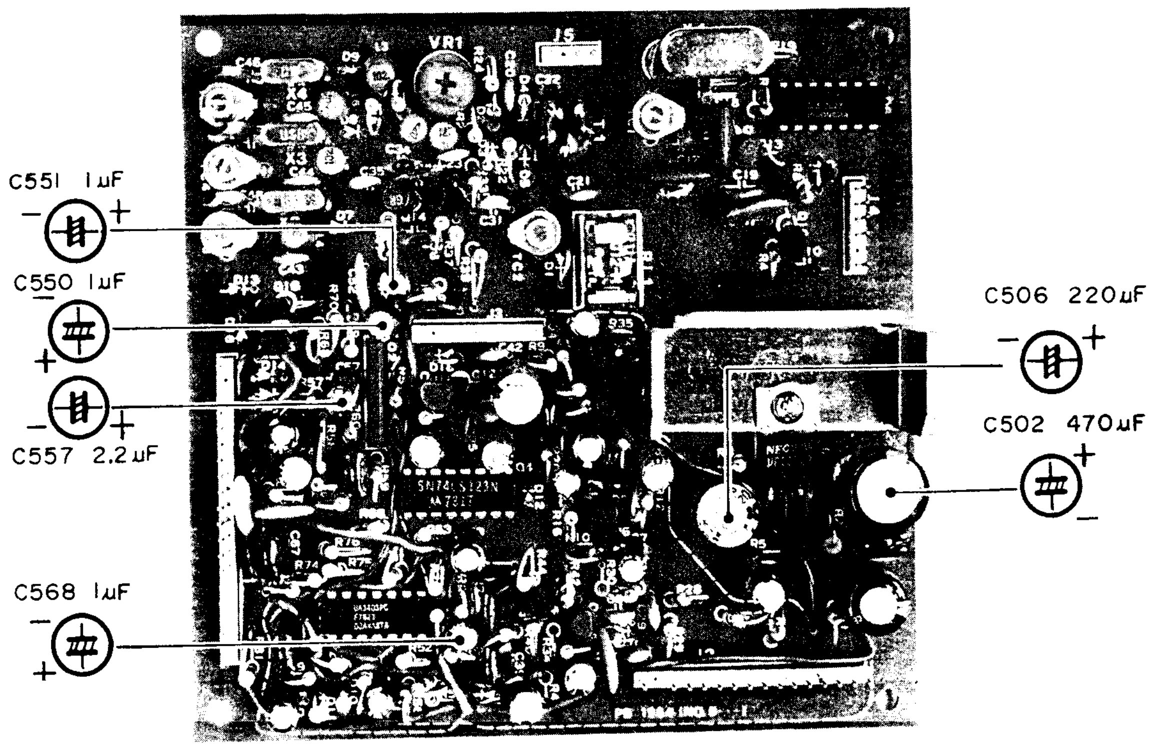
In FT-101Z/ZD transceivers bearing serial numbers from the first six production lots, a mistake in the printing on the AF Unit caused several capacitors to be installed in reverse order for their intended purpose, although they were correct according to the printing. In many sets no serious deterioration in performance is noted at all; however, if you get a set for servicing which displays AF oscillation, distortion, or low output, this may be a good place to check. The reversed capacitors should be replaced with new ones installed in the proper position.

The capacitors affected are:

- $C_{502}$ (470 $\mu$F)
- $C_{506}$ (220 $\mu$F)
- $C_{550}$ (1 $\mu$F)
- $C_{551}$ (1 $\mu$F)
- $C_{557}$ (2.2 $\mu$F)
- $C_{568}$ (1 $\mu$F)

In sets from production lots 7 through 10, the printing is not correct, but the capacitors have been correctly installed. The prints on pages 3-60 and 3-61 are correct, as is the schematic diagram.





# MAINTENANCE AND ALIGNMENT

## WARNING

DANGEROUS VOLTAGES ARE PRESENT WITHIN THIS TRANSCEIVER. USE EXTREME CAUTION WHEN WORKING ON THE TRANSCEIVER WITH THE COVERS REMOVED. DISCHARGE ALL CAPACITORS BY SHORTING THEM TO GROUND WITH AN INSULATED SCREWDRIVER AFTER POWER HAS BEEN REMOVED. OBSERVE NORMAL SAFETY PRECAUTIONS AT ALL TIMES.

## CAUTION

Never operate this transceiver in the transmit mode without a matched antenna or dummy load connected to the antenna receptacle on the rear panel. It is possible to damage the final amplifier tubes and the pi network components if the transmitter is operated without the proper load termination.

## GENERAL

This transceiver has been carefully aligned and tested at the factory. With normal use, it should not require other than the usual attention given to electronic equipment. Service or realignment of a major component may require substantial adjustment; under no circumstances, though, should realignment be attempted unless the operation of the transceiver is fully understood, the malfunction has been carefully analyzed, and the fault has definitely been traced to misalignment. Sudden difficulties are almost always caused by component failure rather than misalignment.

Service work should only be performed by experienced personnel, using the proper test equipment.

## EQUIPMENT REQUIRED

(1) RF Signal Generator: Hewlett-Packard Model 606A or equivalent, with one volt output at 50 ohms, and frequency coverage to 30 MHz.

(2) Vacuum Tube Voltmeter (VTVM): Hewlett-Packard Model 410B or equivalent, with an RF probe good to 40 MHz.

(3) Dummy Load: Yaesu Model YP-150 or equivalent, with 50 ohm non-reactive load impedance, rated to 150 watts average power.

(4) AF Signal Generator: Hewlett-Packard Model 200AB or equivalent.

(5) A general coverage receiver covering 3 to 30 MHz, with a 100 kHz crystal calibrator.

(6) A frequency counter, Yaesu Model YC-500 or equivalent, with resolution to 0.01 kHz and frequency coverage to 30 MHz.

(7) An oscilloscope, Hewlett-Packard Model 1740A or equivalent.

## AF UNIT ALIGNMENT

### VOX Circuit

**A. Antitrip level setting**

1. Tune in a signal on the FT-101ZD receiver, and adjust the AF GAIN control for a normal listening level. Position the microphone near the speaker, with the MODE switch in the SSB mode. Increase the VOX GAIN control on the front panel until the speaker output causes the VOX relay to switch the transceiver to transmit. Set the ANTITRIP control $VR_9$, located on the rear apron, to the point that will just prevent the speaker output from tripping the VOX relay.

2. Now place the microphone in the normal operating position, and speak into the microphone to see if your voice will activate the VOX relay. If not, $VR_9$ may be advanced too far.

**B. VOX relay delay setting**

1. Adjust the DELAY control $VR_{2b}$, located on the front panel, for the desired delay time. This may require a different setting for phone and CW operation, owing to differing operating techniques. For CW or phone operation using a footswitch, the VOX GAIN control may be rotated fully counter-clockwise to the PTT position.

### CW Sidetone

1. The CW sidetone level may be adjusted by means of $VR_{10}$, located on the rear apron.

### Marker Frequency setting

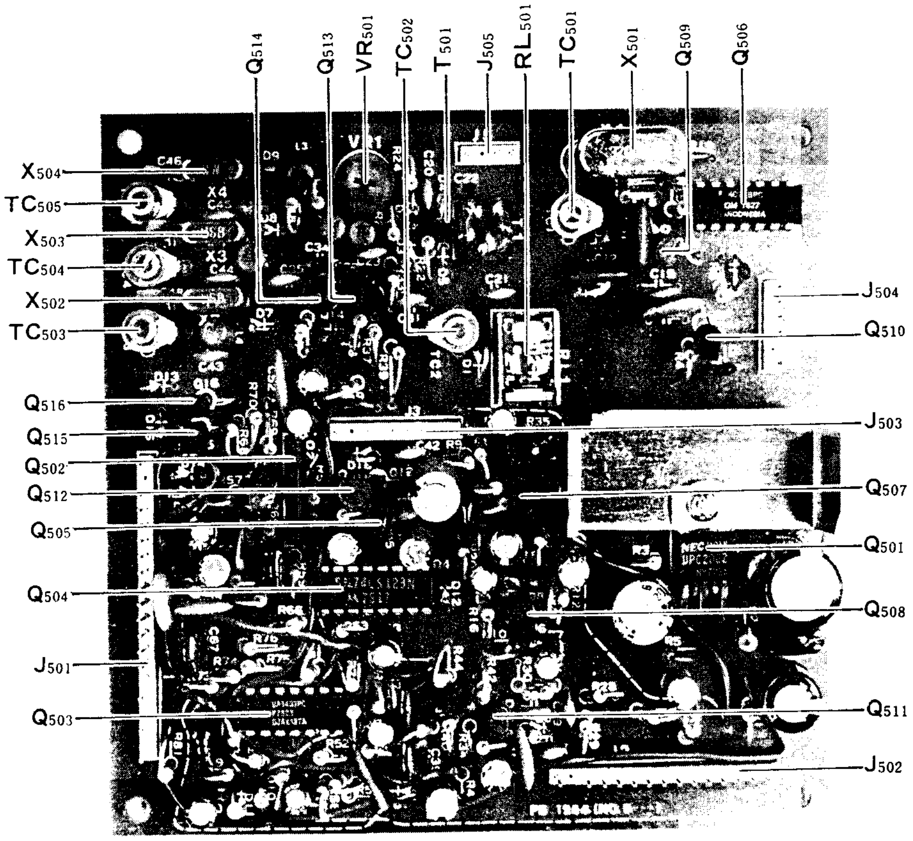
1. Preset the controls as follows:
   BAND ...... JJY/WWV
   DIAL ...... 5000.0 kHz
   PRESELECT . Peaked for maximum response
   MODE ...... TUNE
2. Place the NB/MARK switch in the MARK position. Tune in the WWV or JJY signal, and adjust $TC_{501}$ for an exact zero beat with the carrier of the incoming signal.

### Carrier Frequency Adjustment

A. **SSB Carrier Point**

1. Tune up the transmitter on 20 meters, LSB mode, into a dummy load. Apply a 1 kHz audio signal to the microphone input, and adjust the audio generator output until the transmitter power output is 60 watts, as indicated on the dummy load wattmeter.
2. Shift the audio generator output frequency to 300 Hz, without changing the output level. Adjust $TC_{503}$ for a power output reading of 15 watts on the wattmeter.
3. Shift the MODE switch to USB. Adjust $TC_{504}$ for an identical 15 watt reading on the wattmeter.






AF UNIT(PB-1964)

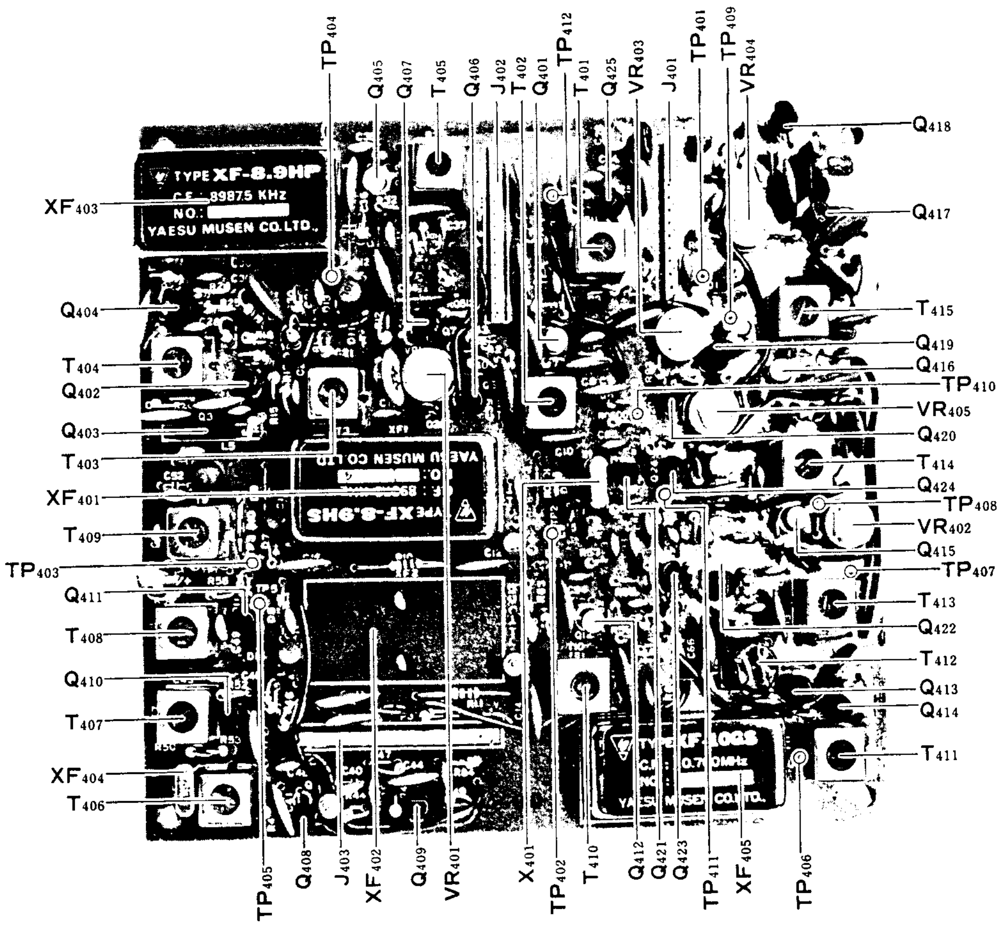
4. Recheck the LSB adjustment, as well as the carrier balance adjustment, after performing the carrier point alignment. The background noise, when switching between USB and LSB, should not change.

B. **Carrier Balance**

1. Tune up the transceiver on 20 meters, USB mode, into a dummy load. Set the main tuning dial to 14.250 MHz. Connect the RF probe of the VTVM to the antenna jack. Disconnect all microphones, etc., from the microphone jack.
2. Activate the transmitter by placing the VOX GAIN control into the MOX position. Adjust $VR_{501}$ and $TC_{502}$ for a minimum VTVM reading.
3. If a VTVM is unavailable, use an external monitor receiver, tuned to the transmitter frequency, and adjust $VR_{501}$ and $TC_{502}$ for a minimum S-meter reading on the external receiver.
4. This adjustment should be repeated several times on LSB and USB, in order to ensure complete carrier nulling.

C. **CW Carrier Point**

1. Connect a frequency counter to $TP_{402}$, located on the IF UNIT. Place the MODE switch in the TUNE position.
2. Adjust $TC_{505}$ for a frequency counter reading of exactly 8988.3 kHz.
3. When using the optional CW filter, a substantial loss on transmit, when in the CW-N position, may indicate the need for adjustment as indicated in steps 1 and 2.




IF UNIT(PB-1963)

## IF UNIT ALIGNMENT

### S-Meter Sensitivity Adjustment

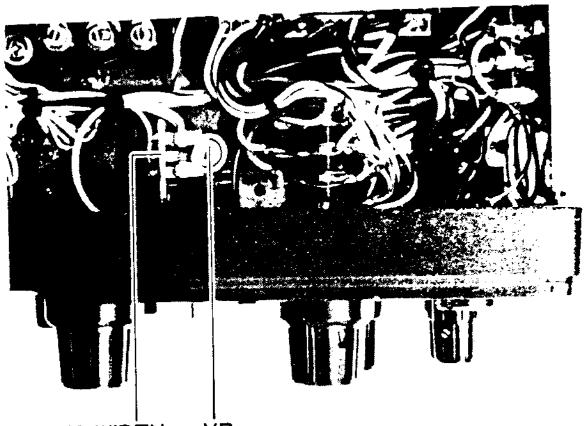
1. Set the BAND switch to 20 meters, the main dial to 14.250 MHz, and set the RF GAIN fully clockwise.
2. Set the signal generator to 14.250 MHz, and set its output to 6 dB. Tune the signal generator signal on the receiver, and peak the preselector for maximum signal strength. The S-meter should just begin to move with the 6 dB input.
3. Adjust $VR_{403}$ for a reading of 0 on the S-meter.
4. Set the generator output to 100 dB, and adjust $VR_{405}$ for a reading of S9 + 60 dB on the S-meter. Confirm that the preselector is peaked.
5. Return the signal generator output to 6 dB, and recheck the adjustment of $VR_{403}$ .

### Variable IF Bandwidth Alignment

1. Set the controls as follows:
   BAND . . . . . . . . 20 m
   DIAL . . . . . . . . 14.200 MHz
   RF GAIN . . . . . Fully clockwise
   WIDTH switch . . OFF
   MODE . . . . . . . . USB
   Peak the preselector for maximum response against the marker signal or background noise.
2. Connect the frequency counter to $TP_{411}$. Adjust $VR_{1501}$ for a reading of exactly 19.7475 MHz.
3. Place the WIDTH switch ON. Make sure that the WIDTH control is exactly in the 12 o'clock position. Adjust $VR_{404}$ for a reading of exactly 19.7475 MHz on the frequency counter.
4. Switch between USB and LSB, and observe the background noise. If there is any difference, adjust $VR_{1501}$ until the background noise is the same.

### ALC Meter Alignment

1. On any band, set the MODE switch to USB. Set the meter switch to ALC.
2. With no speech input, activate the transmitter. Adjust $VR_{401}$ for a 0 reading on the ALC meter scale.

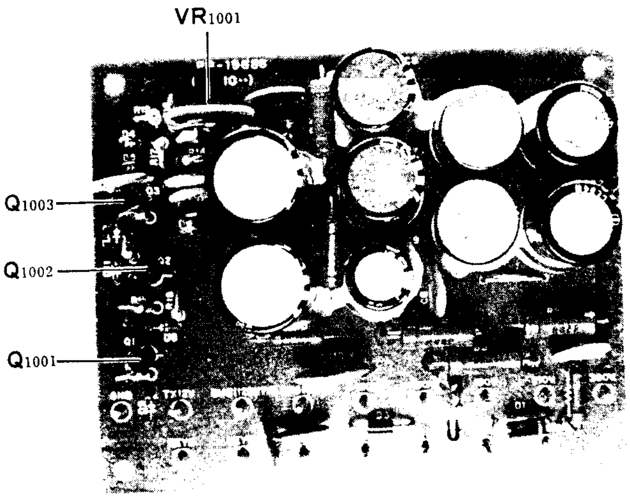





## RECTIFIER B UNIT

### Bias Adjustment

1. Set the MODE switch to USB or LSB, and set the MIC GAIN control fully counterclockwise.
2. Place the METER switch in the IC position, and set the VOX GAIN control to VOX. Adjust the PB-1968 BIAS control, $VR_{1001}$, for a reading of 50 mA. For 10 watt models, the correct meter reading is 25 mA.




RECT.B UNIT(PB-1968)

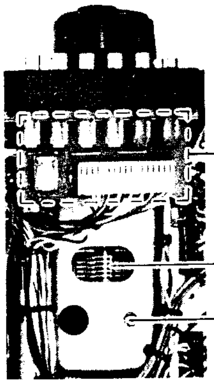
## VFO UNIT

The VFO UNIT is very critical in its adjustment. As well, this is not an area which should ever require alignment. Questions regarding drift, etc., usually can be traced to other areas of the transceiver (instability in the supply voltage, etc.). For this reason, all cases regarding VFO repair should be referred to an experienced service technician.

The following components are of interest from a service standpoint:

$TC_{801}$ is the band set trimmer.
$TC_{802}$ is the VFO level set trimmer.

To confirm proper VFO injection, connect the VTVM to the VFO output. Adjust $TC_{802}$ for a reading of 100 mV.




| BAND | CRYSTAL | FREQUENCY | TRANSFORMER |
|---|---|---|---|
| 160m | $X_{601}$ | 15.9875MHz | T601 |
| 80m | $X_{602}$ | 17.9875 | T602 |
| 40m | $X_{603}$ | 21.4875 | T603 |
| 20m | $X_{604}$ | 28.4875 | T604 |
| 15m | $X_{605}$ | 35.4875 | T605 |
| 10mA | $X_{606}$ | 42.4875 | T606 |
| 10mB | $X_{607}$ | 42.9875 | T607 |
| 10mC | $X_{608}$ | 43.4875 | T608 |
| 10mD | $X_{609}$ | 43.9875 | T609 |
| JJY/WWY | $X_{610}$ | 19.4875 | T610 |

Table 7

## NB-FIX UNIT

### Fixed Channel Frequency Alignment

When the optional fixed channel crystals are being used, they may be placed exactly on the correct frequency by adjusting $TC_{201}$ (for channel 1) and $TC_{202}$ (for channel 2). Confirmation of the correct frequency may be made with an external receiver or by loosely coupling a probe from the frequency counter to the transmitter output. A 1-turn loop is usually sufficient to provide indication on the counter.

## PREMIX LOCAL UNIT

### Premix Local Alignment.

1. Connect the RF probe of the VTVM to pin 1 of $MJ_3$.
2. Refer to Table 7, and adjust the appropriate transformer for a level of 300 mV for each band and crystal, as shown in the table.

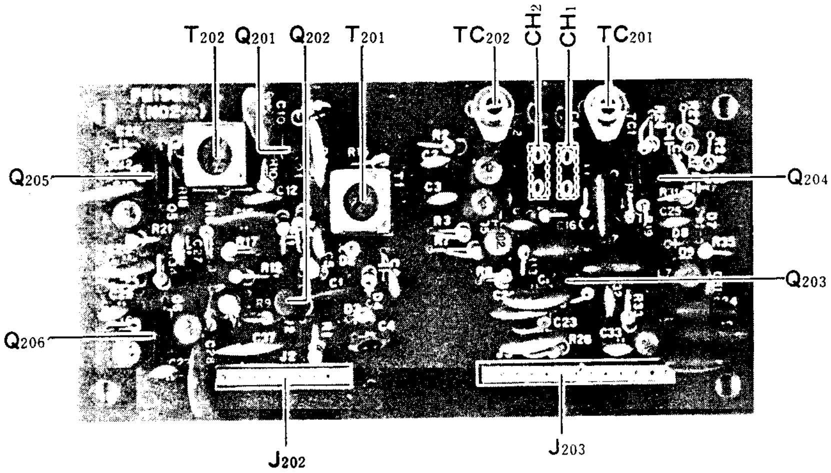
## PREMIX UNIT

For this alignment, a wideband (not peak) sweep generator, as well as an oscilloscope, should be used.

1. Press the EXT select switch. Apply 5.0 - 5.5 MHz sweep output to the VFO output terminal at the rear apron external VFO jack. Connect a high-impedance probe of an oscilloscope to $J_{301}$.
2. Adjust the transformers shown in Table 8 for a flat response across the entire passband. If you have never adjusted a bandpass filter previously, this may take some practice. Perform the adjustments on each band, according to the chart.

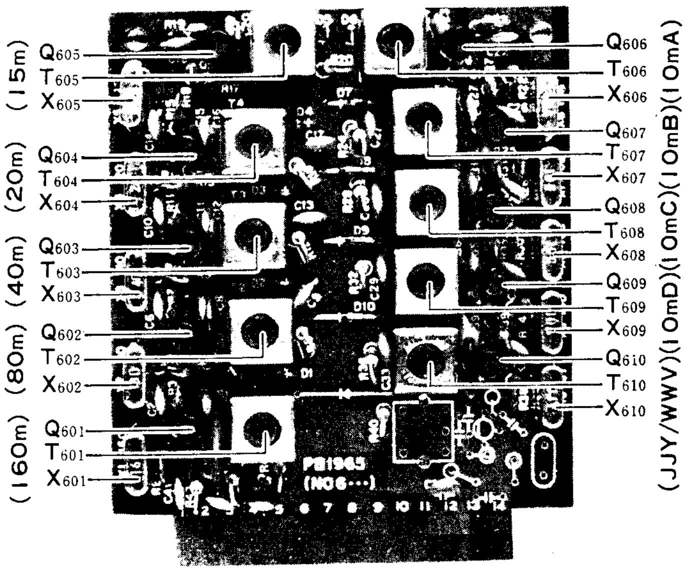
| BAND | TRANS-FORMER | PASSBAND |
|---|---|---|
| 160m | $T_{301}$, $T_{302}$ | 10.4—11.0(MHz) |
| 80m | $T_{303}$, $T_{304}$ | 12.4—13.0 |
| 40m | $T_{305}$, $T_{306}$ | 15.9—16.5 |
| 20m | $T_{307}$, $T_{308}$ | 22.9—23.5 |
| 15m | $T_{309}$, $T_{310}$ | 29.9—30.5 |
| 10mA | $T_{311}$, $T_{332}$ | 36.9—39.0 |
| JJY/WWV | $T_{313}$, $T_{314}$ | 13.9—14.5 |

Table 8

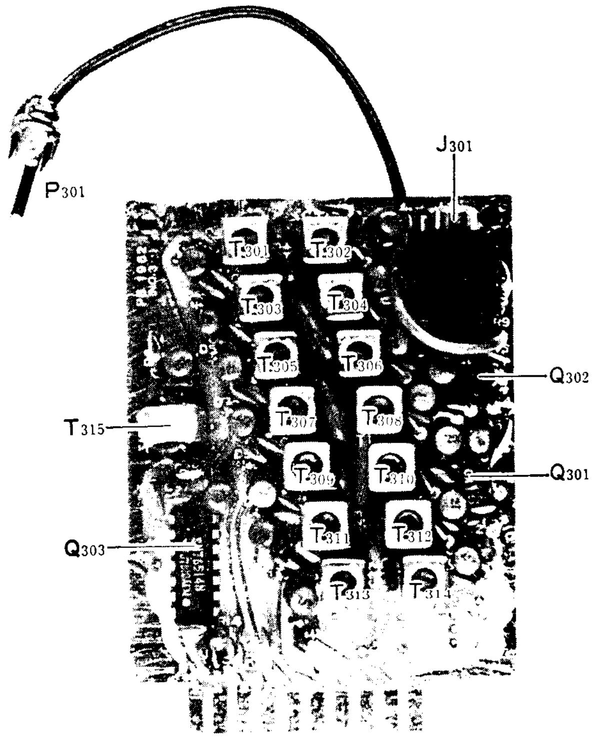



NB·FIX UNIT(PB-1961)






PREMIX LOCAL(XTAL)UNIT(PB-1965)




PREMIX UNIT(PB-1962)

AM UNIT (After production lot #8)

1. Set the BAND switch to 40, the MODE switch to AM, and the DRIVE control to the 3 o'clock position. Tune up the transmitter in the usual fashion. Now adjust the core of $T_{2401}$ for maximum power output into the dummy load/wattmeter.
2. Connect a frequency counter to $TP_{2402}$. Adjust $TC_{2401}$ for a counter reading of exactly 8988.3 kHz while transmitting.
3. Connect the RF probe of the VTVM to $TP_{2401}$, and adjust $TC_{2402}$ for a reading of 50 mV while transmitting.

TRANSMIT RF/IF TRANSFORMER ALIGNMENT

(1) Connect a dummy load to the antenna jack, and connect an audio signal generator to the microphone input. Tune up the transmitter at 14.2 MHz, and adjust the audio generator output for approximately 50 watts output into the dummy load, single-tone, SSB mode.

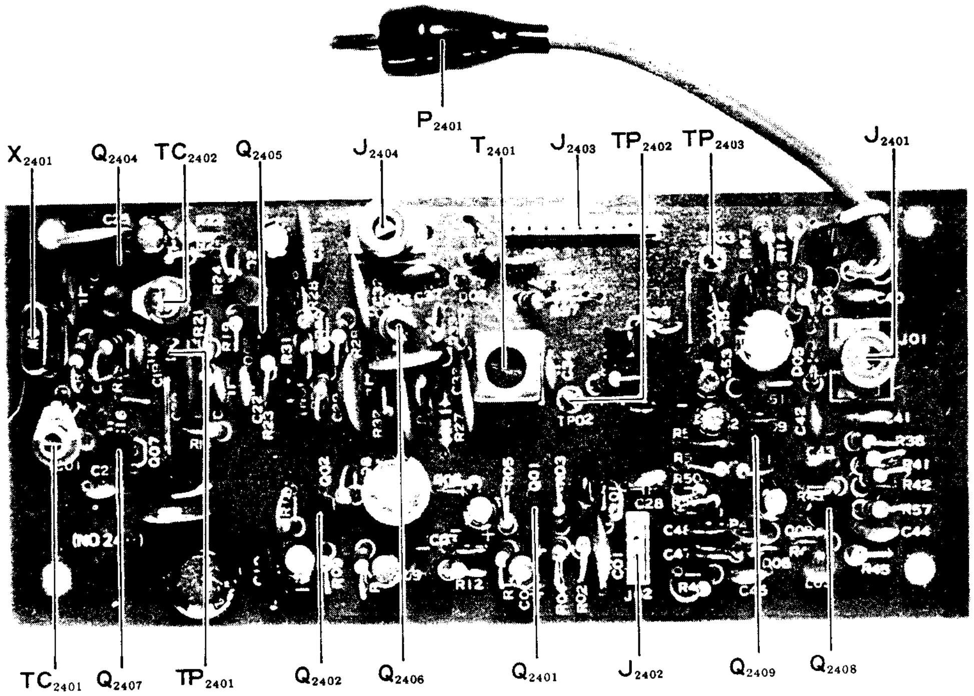
(2) Peak $T_{104}$ (RF UNIT) for maximum power output.

(3) Peak $T_{401}$ - $T_{403}$ and $T_{405}$ (IF UNIT) for maximum power output. Switch the RF processor on, and adjust the COMP LEVEL control for approximately 50 watts output. Peak $T_{404}$ for maximum power output.

RECEIVER RF/IF/NB TRANSFORMER ALIGNMENT

(1) Tune in the marker generator signal at 14.2 MHz, with a dummy load connected to the antenna jack. Peak the preselector for maximum S-meter indication.

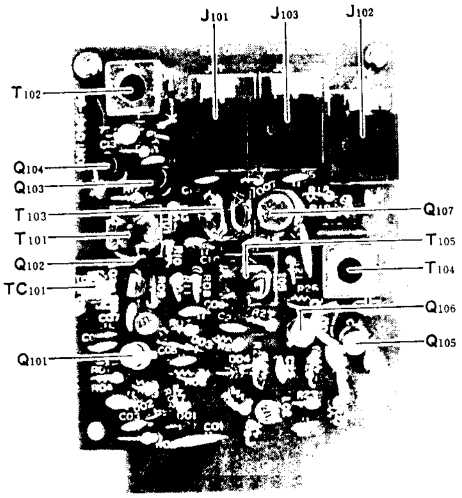
(2) Peak $T_{102}$ (RF UNIT) for maximum S-meter indication.




AM UNIT (PB-2040)

(3) Peak $T_{406}$ - $T_{411}$ and $T_{413}$ - $T_{415}$ for maximum S-meter indication.

(4) Connect the RF probe of a VTVM to the collector of $Q_{202}$ (NB-FIX UNIT). Reduce the RF GAIN control somewhat, and tune $T_{201}$ and $T_{202}$ for a dip in the VTVM indication. If no dip is observed, reduce the RF GAIN control further.




RF UNIT(PB-1960)



## ALIGNMENT OF TRANSMITTER MIXER/ DRIVER AND RECEIVER FRONT END STAGES

### CAUTION

Be certain not to exceed the recommended 10 seconds of key down time while performing the alignment of the transmitter mixer and driver stages, as described below. Always dip the PLATE control to establish resonance before proceeding with any adjustments. Off-resonance operation will shorten tube life dramatically.

(1) Connect a dummy load/wattmeter to the rear panel ANT jack.

(2) Set the MODE switch to TUNE, the BAND switch to 40, the VFO dial to 000, the PRESELECTOR control to 6 (on the scale of 1-10), and the DRIVE control fully clockwise. Connect a dummy load/wattmeter to the antenna jack, and set the neutralization trimmer $TC_1$ to the ½ position shown in Figure 2.

(3) Close the PTT switch, and dip the PLATE control for a minimum IC reading on the transceiver meter (the LOAD control should be set to the nominal setting shown in the "operation" section of this manual). Now adjust $TC_{1403}$ for maximum power output into the wattmeter.

(4) Set the BAND switch to 10D, the PRESELECTOR control to 10 (on the scale of 1-10), and reduce the setting of the DRIVE CONTROL. Preset $TC_{1206}$ to the ½ position, and $TC_{1306}$ to the 1/3 position, as shown in Figure21. Set the LOAD control to the correct position, and close the PTT switch. Dip the PLATE control for minimum IC reading on the transceiver meter. Now advance the DRIVE control to the point where maximum power output is obtained (do not go beyond the maximum PO point). Adjust the cores of $T_2$ and $T_3$ for maximum power output. Do not exceed the 10 second key down limitation during this adjustment.

(5) On receive, set the RF GAIN control fully clockwise, and turn the marker on. Tune in the marker signal at 30.000 MHz, and adjust $T_2$ and $T_3$ **slightly** for maximum deflection on the S-meter. Now recheck the peaking on transmit; several repetitions may be necessary to secure the proper ratio.

(6) Locate $T_1$, and set its core to the same physical level as the cores of $T_2$ and $T_3$ were set in step (5).

(7) Set the BAND switch to 10A, the VFO dial to 000, and tune up the transmitter. Peak the PRESELECTOR control for maximum power output. Now adjust $TC_{1306}$ for maximum power output into the wattmeter. On receive, tune to the marker signal at 28.000 MHz, and adjust $TC_{1206}$ (and $TC_{101}$ on the RF UNIT) for maximum deflection of the S-meter.

(8) As there may be some interaction of adjustments, please repeat steps (3) through (7), so as to be sure of proper tracking.

(9) Adjust the final amplifier neutralization, as described on page 3-35

(10) Again recheck steps (3) through (7).

(11) Now you are ready to align the other bands. Set the BAND switch to 15, the VFO dial to 000, and the PRESELECTOR control to 8.5 (on the scale of 1-10). Set the LOAD control to the proper position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust $TC_{1405}$ and $TC_{1305}$ for maximum power output into the wattmeter. On receive, tune to the marker signal at 21.000 MHz, and peak $TC_{1205}$ for maximum S-meter deflection on the marker signal.

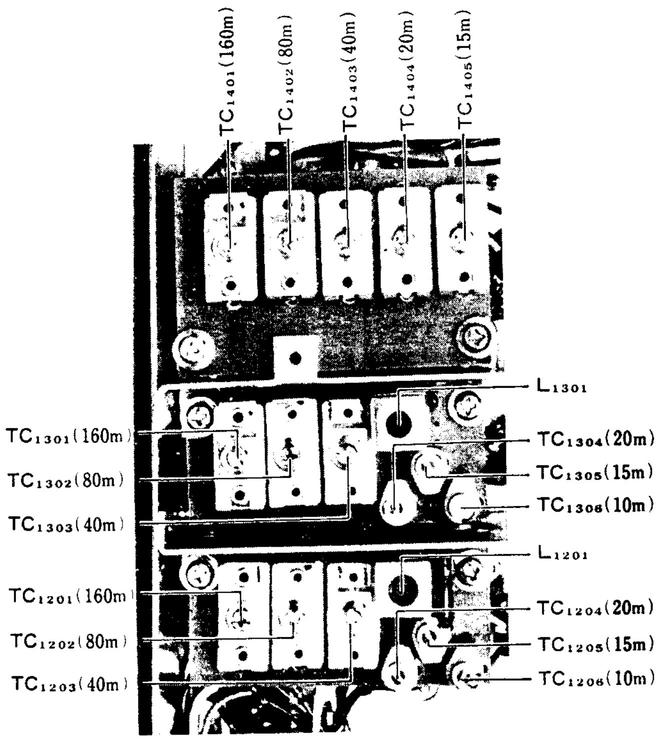
(12) Set the BAND switch to 20, the VFO dial to 000, and the PRESELECTOR control to 8 (on the scale of 1-10). Set the LOAD control to the proper position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust $TC_{1404}$ and $TC_{1304}$ for maximum power output into the wattmeter. On receive, tune to the marker signal at 14.000 MHz, and adjust $TC_{1204}$ for maximum S-meter deflection on the marker signal.

(13) Set the BAND switch to 40, the VFO dial to 000, and the PRESELECTOR control to 6 (on the scale of 1-10). Set the LOAD control to the correct position. Close the PTT switch, and dip the PLATE control for minimum IC reading on the transceiver meter. Now adjust $TC_{1403}$ and $TC_{1303}$ for maximum power output into the wattmeter. On receive, tune to the marker signal at 7.000 MHz, and adjust $TC_{1203}$ for maximum S-meter deflection on the marker signal.

(14) To adjust the trap tuning, leave the VFO dial at 000, and the PRESELECTOR at 6. Remove the dummy load/wattmeter from the antenna jack, and connect a signal generator to the antenna jack. Inject a 90 dB signal at 9.9875 MHz. Adjust $L_{1201}$ and $L_{1301}$ for minimum S-meter deflection. Remove the signal generator, and reconnect the dummy load/wattmeter.

(15) Set the BAND switch to 80, the VFO dial to 000, and the PRESELECTOR control to 2.5 (on the scale of 1-10). Set the LOAD control to the correct position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust $TC_{1402}$ and $TC_{1302}$ for maximum power output into the wattmeter. On receive, tune to the marker signal at 3.500 MHz , and adjust $TC_{1202}$ for maximum S-meter deflection on the marker signal.

(16) Set the BAND switch to 160, the VFO dial to 400 (1.900 MHz), and the PRESELECTOR control to 1.2 (on the scale of 1-10). Set the LOAD control to the correct position. Close the PTT switch, and dip the PLATE control for minimum IC indication on the transceiver meter. Now adjust $TC_{1401}$ and $TC_{1301}$ for maximum power output into the dummy load. On receive, tune to the marker signal at 1.900 MHz, and adjust $TC_{1201}$ for maximum S-meter deflection on the marker signal.



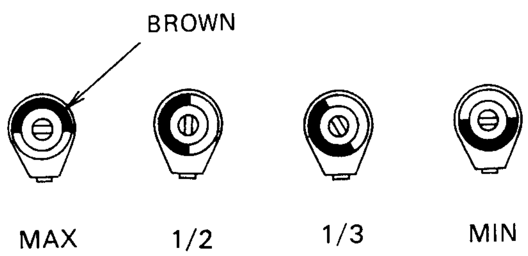




Figure 21

## ADVICE ON TROUBLESHOOTING THE DRIVER/FINAL AMPLIFIER STAGES

Three tubes are used in the FT-101ZD: a 12BY7A driver, and two 6146Bs in the final amplifier.

Because not all service personnel are as familiar with tubes as they are with semiconductors, we would begin by cautioning you that tubes are voltage devices. To produce power in useful amounts, they require voltages well in excess of that needed for solid state devices. Take care, lest you develop "serviceman's elbow," a malady well known to old timers. It occurs when your arm jerks back from the +800 volts right into some immovable object. Accompanied by a few colorful phrases, it is not an experience one knowingly encourages, though it is seldom fatal.

The old adage of "keep one hand in your hip pocket" should be heeded whenever working in areas of exposed high voltage. If you **should** come into contact with the high voltage, it is best to call it quits for the service day. Alert your colleagues to what happened, and do not hesitate for even 5 minutes to seek medical attention should **any** signs of shock (trauma) develop. Trauma following contact with high voltage is sometimes more dangerous than the high voltage itself. IT CAN BE FATAL!

Never work on high voltage circuits while alone. You may need someone to turn off the power in an emergency. SAFETY FIRST!

## FINAL AMPLIFIER NEUTRALIZATION

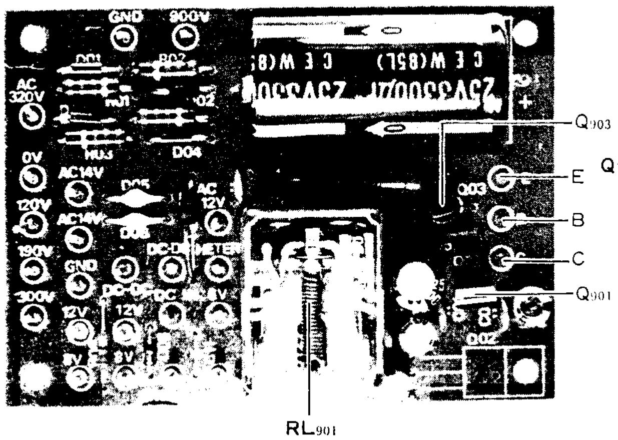
Important Note: For this alignment, use a NON-METALLIC tuning wand.

(1) Set the BAND switch to 10C, set the tuning dial to 29 MHz, and tune into a dummy load for approximately 70% full output power.

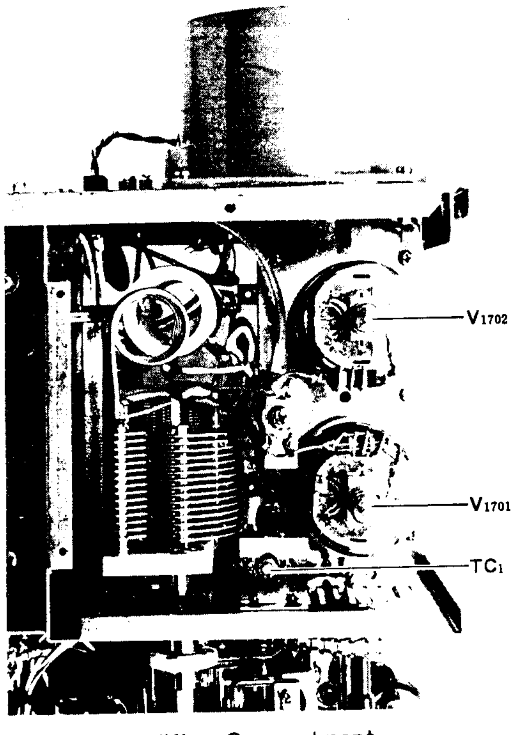
(2) Set the METER switch to IC, and observe the dip in the cathode current. The dip should occur at the same point that maximum power output (measured on the dummy load wattmeter) occurs. If this is not the case, adjust $TC_1$, located inside the final amplifier cage, for the required coincidence of maximum power output and dip on the IC meter.

CAUTION: HIGH VOLTAGES ARE PRESENT ON THE UNDERSIDE OF THE CHASSIS AND INSIDE THE FINAL AMPLIFIER COMPARTMENT. USE GREAT CARE WHILE MAKING ADJUSTMENTS IN AREAS OF EXPOSED WIRING.

Note: The final amplifier enclosure must be in place to provide the required RF shielding during the neutralization procedure.




RECT A UNIT(PB-1967)



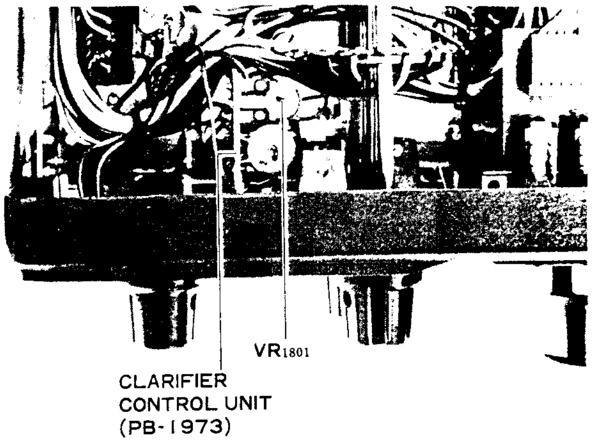

Final Amplifier Compartment

## CLARIFIER ALIGNMENT

(1) Tune in the marker generator signal on any band, and peak the preselector on the marker signal.

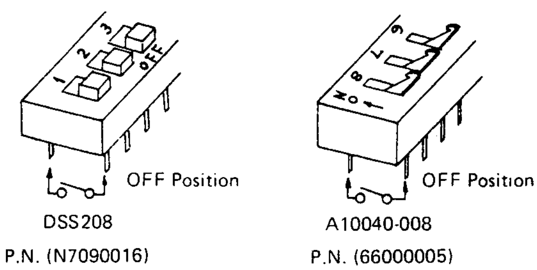
(2) With the CLARIFIER control OFF, make sure that the CLARIFIER knob is exactly at the 12 o'clock position. Note the tone of the marker signal.

(3) Switch the RX CLARIFIER to ON, and observe the tone of the marker signal. If it is different from when the clarifier was turned off, adjust $VR_{1801}$ for an identical tone with the CLARIFIER knob exactly on the zero mark.

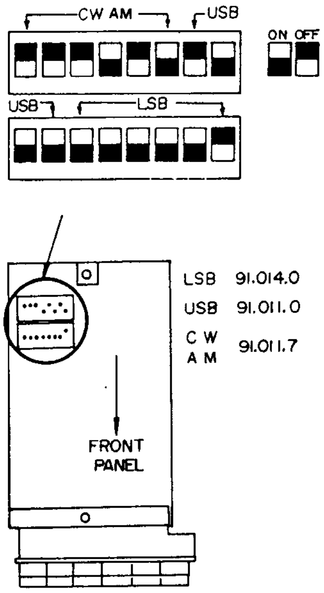



## COUNTER UNIT (Early model ... Prod. #01 – #15)

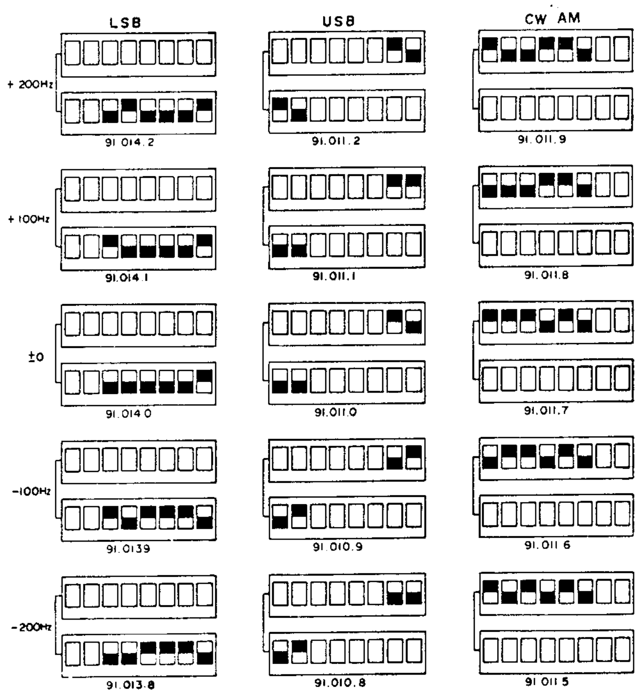
The carrier points for USB, LSB, and CW are preset as follows: USB = 91.011.0; LSB = 91.014.0; CW or AM = 91.011.7. If, for some reason, it is desired to set these frequencies elsewhere, refer to the "Frequency Counter Preset Switch Position" drawing and chart. Adjustment of ±200 Hz is possible as shown. The adjustment is carried out on the miniature switch shown in the drawing.






FREQUENCY COUNTER PRESET SWITCH POSITION



# FAULT LOCALIZATION

The process of troubleshooting is highly individualistic. Fundamentally, though, the process is one of logical elimination.

Begin with a visual inspection of the transceiver, looking for broken, discolored, or charred components. Smell the unit, as burnt transformers smell differently than resistors, etc. If you do find a component that is cooked, remember that another fault may well have caused the destruction of the part you have located.

Set up the unit for test using a dummy load and wattmeter. Never shoot trouble using an antenna.

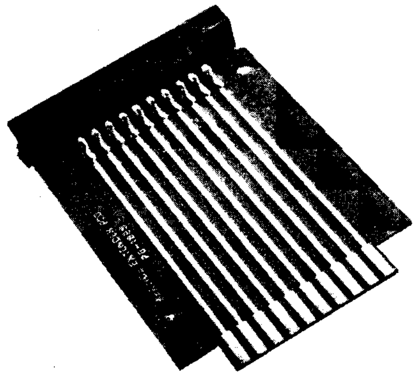
Initially, turn on the receiver, and check out only the RX side. Any malfunctions you detect on the receiver side should be repaired before you check out the transmitter. In doing this, you may well cure the entire problem, as much circuitry is shared on TX and RX.

The logical process of fault identification involves determination of the missing function (no RX on LSB), then the board at fault (AF UNIT), then the band circuit (LSB oscillator), then the malfunctioning part ($X_{502}$).

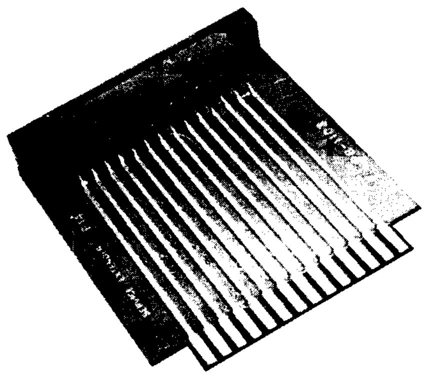
If, after the receiver inspection is completed, all is OK, switch to the transmit side, following the same logical procedure (function-board-circuit-component). Concentrate on those sections unique to the transmit side, as you have already performed a thorough checkout of all receiver and shared circuits (hopefully).

In this section, we will provide troubleshooting advice which leads you directly to suspect components. As the FT-101ZD is a complex electronic instrument, though, it is obviously impossible for us to trace the path of every possible malfunction in the radio. Therefore, if these tips do not lead you to identification of the trouble, the logical elimination process is the way to go.

For troubleshooting, an "extender board" is a valuable tool for quick and easy voltage testing. A double-sided 10-pin extended board will allow tests on the RF and PREMIX boards, and a 14 pin single-face extender will do for the PREMIX LOCAL board. The other boards in the FT-101ZD are not of the plug-in variety, but test points are provided for easy servicing.



10 PIN EXTENDER BOARD



14 PIN EXTENDER BOARD

## TROUBLESHOOTING

## A FUNDAMENTAL ANALYSIS OF THE TROUBLE

The failure may be caused by one of the following:

1) Mechanical defect
2) Electrical defect
3) Others (Murphy's Law, etc.)

### 1. MECHANICAL DEFECTS

Typical mechanical defects encountered by the technician are:

a) Damage from shock during transportation (remember the unit was probably subjected both to sea and truck shipment).
b) Damage caused by vibration in service.
c) Damage caused by forcing stubborn knobs or switches. This difficulty is usually proceded by one of the above two defects.

### 2. ELECTRICAL DEFECTS

Typical electrical defects encountered are:

a) Part(s) failure(s) caused by aging.
b) Failures caused by improper application of supply voltage, or by voltage spikes. An improper fuse in use could cause extensive damage to be sustained.
c) Improper operation (e.g. transistors without load – this usually points to failure elsewhere, in addition to the damaged transistor of IC).
d) Loose connections at the power connector or elsewhere caused by cold solder joints, etc.

### 3. OTHERS

Among the miscellaneous types of failures or difficulties encountered are:

a) Antenna troubles – poor connectors, use of cheap coax not made to withstand weather, and sabotage by neighbors (nail driven through coax, etc.).
b) "Cockpit error:" including mislabeled coax lines to coax switch, or attempt to use transceiver on frequencies other than those it was designed for.
c) Murphy's Law: use of a non-Yaesu microphone with different connections, for example (See page1-11 )

## TYPICAL PART FAILURES, CAUSES, AND SYMPTOMS

| PARTS | CAUSE OF TROUBLE | SYMPTOMS |
|---|---|---|
| Semiconductors<br>(IC, FET, TR) | High supply voltage<br>Open circuit<br>Excessive drive<br>High temperature | Short or open circuit<br>Output decreases to 1/2 at 80°C<br>Internal noise<br>Instability |
| MOS FET<br>MOS IC | Static electricity | Total failure |
| Crystal<br>Crystal filter | Shock<br>High temperature | Crystal destroyed<br>Frequency drift<br>Filter bandpass change |
| Resistor | Excessive power<br>Aging<br>High temperature | Component burned<br>Value changed<br>Open circuit |
| Potentiometer | Excessive power<br>Shock | Component burned<br>Open circuit<br>Noise<br>Unsmooth rotation |
| Capacitor | Excess voltage<br>High temperature<br>Excess power | Shorted<br>Leakage<br>Open/decreased capacitance |
| Variable capacitor<br>Trimmer capacitor | Ratings exceeded<br>Dust between plates<br>Shock, forced rotation | Shorted<br>Leakage<br>Unsmooth rotation |
| Coils | Ratings exceeded<br>Variation | Open or short circuit<br>Leakage or shorted turns<br>Detuned |
| Switch | Ratings exceeded<br>Aging | Poor contact<br>Unsmooth operation<br>Open circuit |
| Relay | Ratings exceeded<br>Humidity | Poor contact<br>Noise<br>Coil open |

RECEIVE MODE

# TROUBLESHOOTING CHART

| Problem | Condition | Probable Cause(s) |
|---|---|---|
| (1) No AC Power applied | (a) Fuse OK | * Defective power switch<br>* Defective AC line cord<br>* Cold solder joint to AC cord<br>* Loose contact at power jack |
| | (b) Fuse blows | * Defective DC-DC Converter (check w/o DC-DC Converter)<br>* Defective $D_{901}-D_{904}$<br>* High voltage line shorted<br>* Short in 6146B electrodes<br>* Defective $D_{905}$, $D_{906}$ in 13.6 VDC line<br>* Defective $D_{1001}-D_{1003}$ in DC 300 and 210 V line<br>* Short in pilot lamp supply<br>* Improper transformer connections |
| | (c) Fuse blows after tubes warm up | * Defective 6146B<br>* Defective $R_{1013}$, $R_{1703}$, $L_{1701}$<br>* Cold solder joint to pin 5 of 6146B socket<br>* Defective bypass capacitor in control grid circuit<br>* Check for −130 volts bias on 6146B<br>* Leakage or short at $C_{1701}$<br>* Leakage or short at $C_1$ |
|  | (d) Tube heaters do not light up. | * Defective heater switch<br>* Cold soldering in heater supply line<br>* Defective tube<br>* ACC plug not installed<br>* Loose connection at tube socket or ACC jack |
| | (e) No DC operation, OK on AC | * Defective DC cord |
| | (f) OK on AC, fuse blows on DC with heater switch on | * Defective T20A6 transistor in DC-DC Converter<br>* Defective $D_{1001}-D_{1003}$, $D_{905}$, $D_{906}$ |
| | (g) OK on AC, fuse OK, but no DC operation | * Defective T20A6 transistor<br>* Cold solder joint in DC-DC converter |
| (2) No reception | (a) S-meter OK, but no audio output from speaker | * Defective speaker<br>* Defective μPC2002H or 2SC1000GR on PB-1964<br>* Defective audio circuit around above transistor/IC<br>* Defective EXT SP jack |

| | | |
|---|---|---|
| | (b) No audio output on some mode: | |
| | LSB | * Defective $X_{502}$, $D_{2404}$ |
| | USB/CW | * Defective $X_{503}$, $D_{2404}$ |
| | AM | * Defective $Q_{2408}$, $Q_{2409}$, $D_{2405}$, $D_{2406}$ |
| | Some mode | * Defective mode switch or cold solder joint on switch |
| | (c) No audio output, S-meter off scale | * Defective RF GAIN control<br>* Defective $Q_{419}$, $Q_{420}$ (PB-1963) |
| | (d) Speaker appears OK, no S-meter deflection | * Defective $RL_1$, $Q_{419}$, $Q_{420}$, $VR_{405}$<br>* Defective 19.7475 MHz xtal<br>* Defective $Q_{421}$, $Q_{422}$, $Q_{423}$<br>* Defective $Q_{411}$<br>* Defective $Q_{101}$–$Q_{104}$ (PB-1960)<br>* Defective $Q_{408}$<br>* Defective $Q_{412}$–$Q_{418}$ |
| | (e) MARKER ON, only slight S-meter deflection on the marker signal | * Low PREMIX output (see section on COMMON CIRCUITS)<br>* Defective $T_1$, $L_{1201}$, or $C_{1207}$<br>* Check tuning or $T_{102}$, $T_{406}$–$T_{415}$<br>* Tracking error in RF coils<br>* Defective $XF_{401}$–$XF_{402}$ or $XF_{405}$ |
| | (f) Normal S-meter deflection against marker signal (S9 +10 dB nominal) | * Defective $FH_2$ (lamp fuse)<br>* Defective $RL_2$ (Antenna Relay)<br>* Defective $S_{2004}$ (ATT) |
| (3) Partial reception | (a) Poor reception on one or more bands (some bands OK) | * Low PREMIX output (see section on COMMON CIRCUITS)<br>* Defective band switch<br>* Defective $TC_{1201}$ (160 m)–$TC_{1206}$ (10 m), $C_{1201}$ (160 m)–$C_{1206}$ (10 m) |
| (4) Self-oscillation | (a) Oscillation with HEATER switch on | * Defective 6146B, $R_{1013}$, $R_{1703}$, $L_{1701}$<br>* Defective $L_{1701}$, $C_1$<br>* Defective $R_{1014}$, $R_{1017}$, $R_{1601}$, $R_{1602}$, $C_{1015}$<br>* Defective $Q_{1002}$, $Q_{1003}$ (PB-1968) |
| | (b) Oscillation with HEATER switch either on or off | * TX 12 V line shorted to RX 12 V line. Check at each board, TX/RX switching diodes and switches. |

| | | |
|---|---|---|
| (5) Marker inoperative | (a) RX OK, no marker signal heard | * Defective NB/MARK switch<br>Check voltage at pin 4 of $J_{504}$ in PB-1964. Should be 8 volts nominally<br>* Defective $X_{501}$<br>* Defective $Q_{606}$, $Q_{609}$ and $Q_{610}$ |

TRANSMITTER

| Problem | Condition | Probable Cause(s) |
|---|---|---|
| (1) No power output | (a) IC OK, but no power output | * Defective $L_1$, $L_2$, $L_9$<br>* Shorted $VC_1$, $VC_2$<br>Defective $C_{66}$<br>* Low bands only: Defective $C_5$ – $C_8$<br>* Defective $RL_2$ |
| | (b) IC OK, but no output on a particular band | * Cold solder joint between band switch and tank coil<br>* Defective band switch |
| | (c) No IC indication | * Defective 6146B<br>* ACC plug not correctly wired or improperly seated<br>* No screen voltage at 6146B because of defective $L_{1804}$, band switch |
| | (d) Idling IC OK, but no drive | * Defective 12BY7A<br>* No screen voltage because of defective $R_{1603}$, $C_{1009}$, $R_{1007}$–$R_{1009}$<br>* Defective $Q_{105}$, $Q_{106}$ or $Q_{405}$ |
| (2) Poor TX | (a) No power output on LSB only | * Defective $X_{502}$ |
| | (b) No power output on USB only | * Defective $X_{503}$ |
| | (c) No power output on both USB/LSB | * Defective $RL_{501}$, $Q_{502}$, $D_{2402}$<br>* No vox operation: defective or grounded MIC or PATCH jack<br>* Defective $Q_{503}$, $Q_{504}$ or $Q_{512}$ |
| | (d) No power output on CW/TUNE | * Defective $X_{504}$, $Q_{401}$, $D_{2402}$ |
| | (e) No CW keying | * Defective mode switch, $Q_{1001}$, and associated circuit<br>* Defective $D_{506}$ if carrier hangs up |
| | (f) No modulation on AM | * Defective $Q_{2401}$–$Q_{2407}$, $D_{2401}$, $X_{2401}$ |
| (3) Abnormal meter | (a) Cannot set ALC meter | * Defective $C_{1016}$<br>* Defective $Q_{405}$, $VR_{401}$<br>* Defective meter switch or $RL_1$ |

| | | |
|---|---|---|
| | (b) ALC meter does not function | * Defective 12BY7A<br>* ALC line shorted to ground<br>* Defective $D_{1006}$, $D_{1007}$<br>* Driver, IF stages require realignment. |
| | (c) Power output OK, no IC meter indication | * Defective $R_{1706}$ or meter switch<br>* Defective $RL_1$ |
| | (d) Power output OK, PO meter does not function | * Improper setting of $VR_8$<br>* Defective $C_{10}$–$C_{12}$, $C_{50}$, $L_7$, $D_1$, $VR_8$, or mode switch |
| (4) No changeover from RX to TX | (a) TX OK in MOX position | * Failure in MIC or PTT line<br>* Loose MIC jack or plug connection |
| | (b) No TX in MOX position | * Defective $VR_1$<br>* Defective $RL_1$, $D_7$ |
| | (c) VOX inoperative | * If no CW semi-break-in, check $Q_{503}$, $Q_{504}$, $Q_{512}$. |
| (5) No return to RX from TX | | * PTT line grounded<br>* Defective $Q_{512}$<br>* Defective $Q_{503}$, $Q_{504}$ |
| (6) Fuse blows on transmit | (a) OK on RX | * Insufficient bias voltage on 6146B |
| (7) TX self-oscillation | (a) OK on receive | * Neutralization of final tubes required<br>* Defective $C_{16}$, $C_{18}$, $C_{15}$, $C_{1605}$<br>* RX 12 V line shorted to TX 12 V or TX 8 V line only on TX |
| (8) RF processor trouble | (a) Low or no output with processor on | * Processor switch defective<br>* Defective $XF_{403}$<br>* Defective $Q_{402}$–$Q_{404}$<br><br>For Service Manuals Contact<br>MAURITRON TECHNICAL SERVICES<br>8 Cherry Tree Rd, Chinnor<br>Oxon OX9 4QY<br>Tel:- 01844-351694 Fax:- 01844-352554<br>Email:- enquiries@mauritron.co.uk |

COMMON CIRCUITS

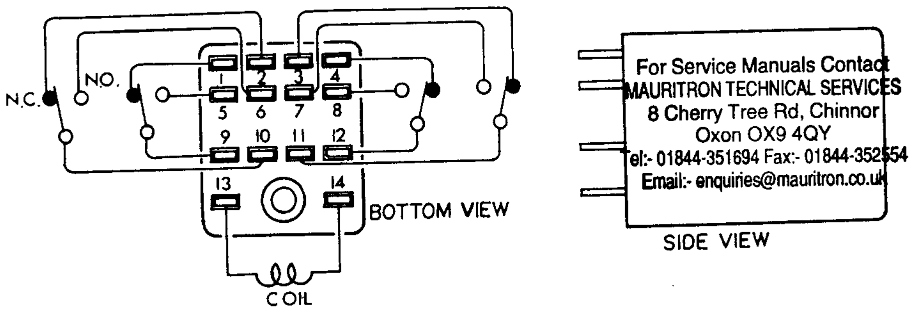
| Problem | Condition | Probable Cause(s) |
|---|---|---|
| (1) Counter circuit | (a) Digital display does not work | * Defective $Q_{2310}$<br>* 5 V line in Counter Unit grounded<br>* Defective display LED<br>* Defective $Q_{2208}$–$Q_{2213}$<br>* Defective $R_{2204}$–$R_{2245}$ |
| | (b) Six digits to the right read below:<br>LSB "91.014.0"<br>USB "91.011.0"<br>CW "91.011.7" | * VFO input not connected or is grounded<br>* Defective $Q_{2301}$–$Q_{2304}$, $Q_{2309}$<br>* Defective 655.36 kHz crystal<br>* Defective $Q_{2305}$ |
| | (c) Display unstable, all digits working OK | * Defective 655.36 MHz crystal<br>* Low PREMIX input (80–120 mV RMS OK) |
| (2) PREMIX LOCAL UNIT | (a) No oscillation on all bands | * Defective BAND switch S1A<br>* Open $R_{22}$<br>* Shorted $C_{53}$<br>* Defective $Q_3$ |
| | (b) No oscillation on particular band | * Switching diode for that band defective (check $D_{601}$–$D_{610}$)<br>* Defective output coil for that band (check $T_{601}$–$T_{610}$)<br>* Defective oscillator transistor for that band (check $Q_{601}$–$Q_{610}$)<br>* Defective crystal for that band (check $X_{601}$–$X_{610}$)<br>* Defective resistor or capacitor in oscillator circuit for that band |
| (3) PREMIX UNIT | (a) Output not correct on all bands (nom. output of 100 mV is OK.) | * Defective $Q_{301}$–$Q_{303}$<br>* Check for 12 V at pin 9 of PREMIX UNIT<br>* Check for local input at pin 7<br>* Defective $R_{308}$, $R_{309}$, $L_{314}$, $L_{315}$<br>* Defective $Q_3$<br>* Defective $R_{22}$, $C_{53}$ |
| | (b) Output not correct on a particular band | * Defective BAND switch S1A<br>* Defective diodes $D_2$–$D_5$<br>* Defective bandpass filter output diode for that band (check $D_{301}$–$D_{314}$)<br>* Defective bandpass filter coil for that band (check $T_{301}$–$T_{314}$)<br>* Defective RF choke for that band (check $L_{301}$–$L_{314}$) |

| | | |
|---|---|---|
| (4) Indicators | (a) WIDTH LED does not work | * Defective LED $D_{1501}$ or $R_{1501}$, $S_{1501}$ |
| | (b) CLARIFIER LED does not work | * Defective LED $D_{1802}$ or $S_{1801}$, $S_{1802}$, $R_{1804}$ |
| | (c) PROCESSOR LED does not work | * Defective LED $D_9$ or $R_{17}$, $S_{2005}$ |
| | (d) $CH_1$, $CH_2$ does not work | * Defective LED $D_{1905}$, $D_{1906}$ or $S_{701}$ (e, f), $R_{1902}$ |
| | (e) TX EXT LED does not work | * Defective LED $D_{1902}$ or $RL_{701}$, $S_{701}$ (a–f), $R_{1902}$ |
| | (f) RX EXT LED does not work | * Defective LED $D_{1903}$ or $RL_{701}$, $S_{701}$ (a–f), $R_{1902}$ |
| | (g) VFO LED does not work | * Defective LED $D_{1904}$ or $S_{701}$ (a–f), $R_{1901}$ |
| | (h) EXT LED does not work | * Defective LED $D_{1901}$ or $S_{701}$ (a–f), $R_{1901}$ |
| (5) Clarifier | (a) Frequency jumps with clarifier on | * Defective $VR_6$, $R_{1801}$, $R_{1802}$, $S_{1801}$, $S_{1802}$, $RL_{1801}$ |
| | (b) OFF and "0" condition do not coincide in frequency | * Defective $VR_{1801}$, $R_{1803}$, $R_{1805}$, $RL_{1801}$ |
| | (c) Frequency jumps with clarifier off, OK with clarifier on | * Defective $VR_{1801}$, $R_{1803}$, $R_{1805}$, $S_{1801}$ |
| | (d) Frequency jumps regardless of clarifier position | * Unstable 8 V REG supply, check $Q_3$.<br>* Check VFO unit |

# RELAY CONNECTION INFORMATION

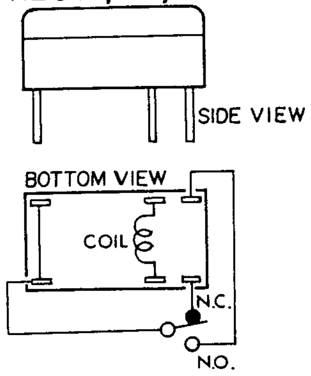
Should the need for replacement of relays become necessary, or if you are trying to verify proper relay operation, the diagrams below should help you.

RL-1,901



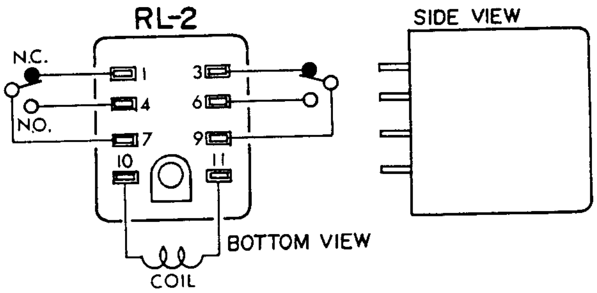


RL-501,701,1801




FBR-211AD012M

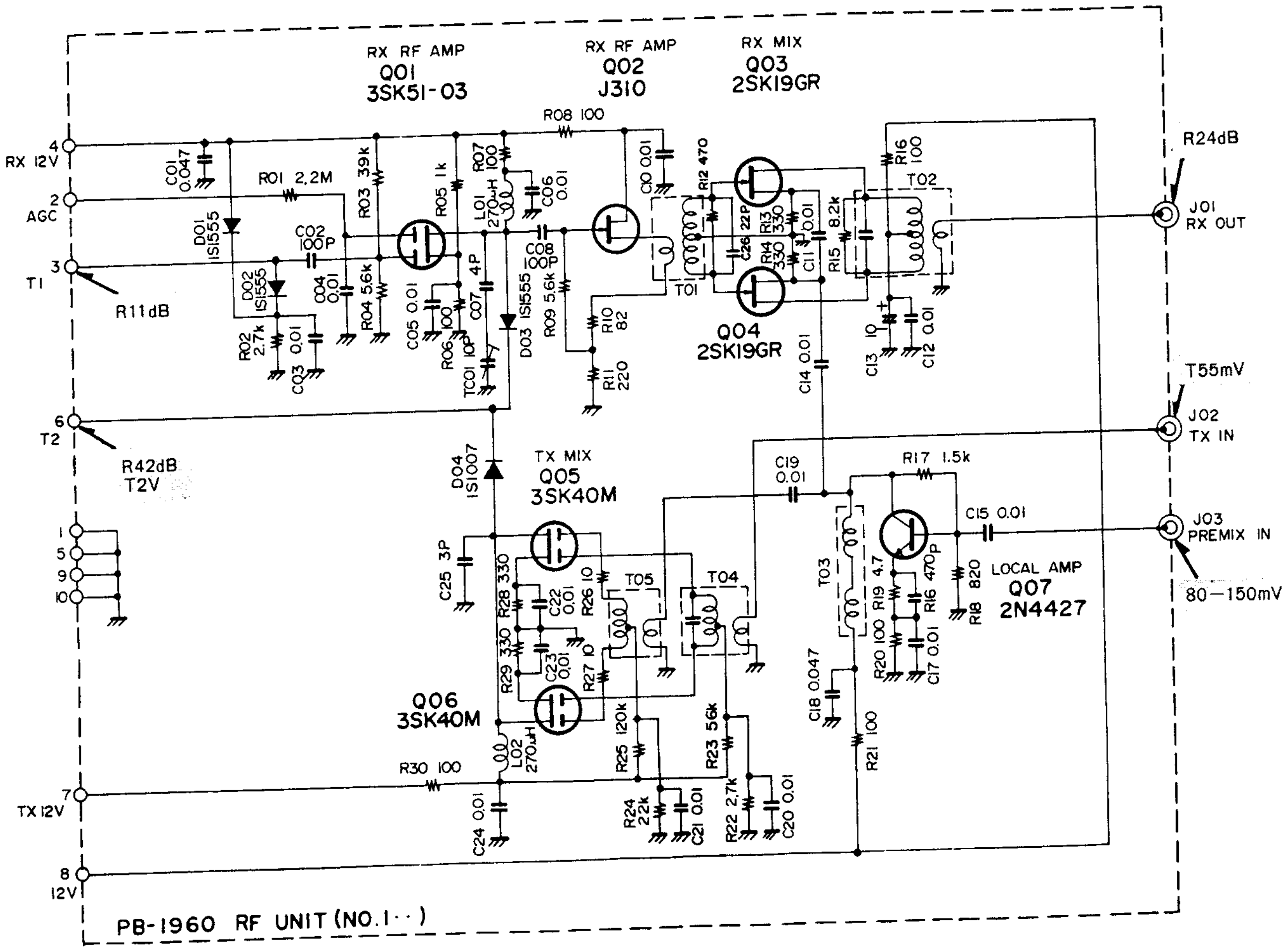
RL-2




MX-2P

# RF UNIT (PB-1960A)

(Early model) Before Prod. #16

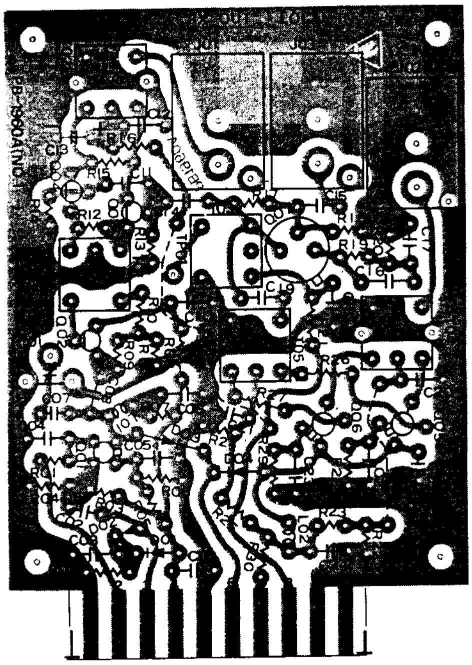



## DC VOLTAGES

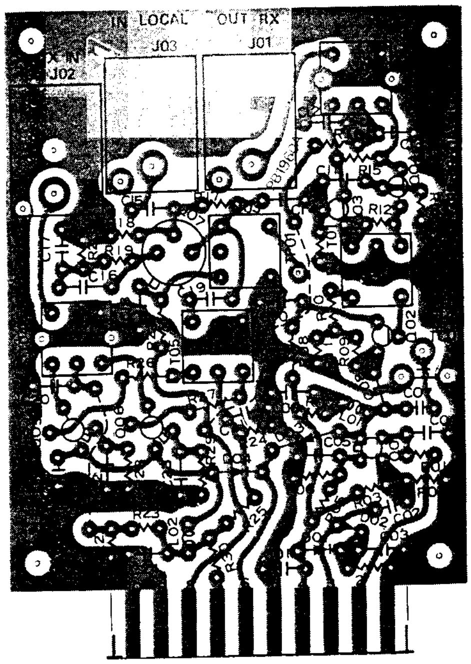
(V)

| | E(S) | | C(D) | | B($G_1$) | | ($G_2$) | |
|---|---|---|---|---|---|---|---|---|
| | R | T | R | T | R | T | R | T |
| $Q_{101}$ | 1.6 | 0 | 10.6 | 0 | 1.5 | 0 | 0.5 | 0.5 |
| $Q_{102}$ | 3.9 | 0 | 10.9 | 0 | 2.8 | 0 | — | — |
| $Q_{103}$ | 1.0 | 0 | 11.6 | 0 | 0 | 0 | — | — |
| $Q_{104}$ | 1.0 | 0 | 11.6 | 0 | 0 | 0 | — | — |
| $Q_{105}$ | 0 | 0.7 | 0 | 10.6 | 0 | 0.5 | 0 | 1.6 |
| $Q_{106}$ | 0 | 0.7 | 0 | 10.6 | 0 | 0.5 | 0 | 1.6 |
| $Q_{107}$ | 2.4 | 2.4 | 9.5 | 9.5 | 3.1 | 3.1 | — | — |

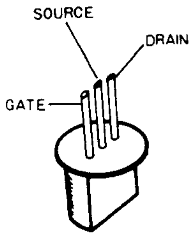
# RF UNIT PARTS LAYOUT



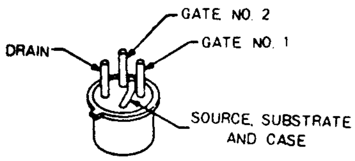
Viewed from component side



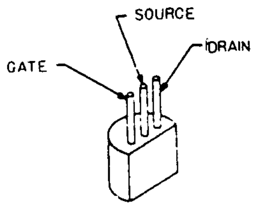
Viewed from solder side



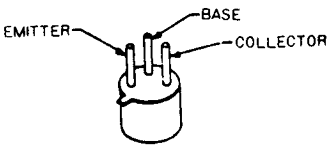

2SK19GR




3SK40M
3SK51-03

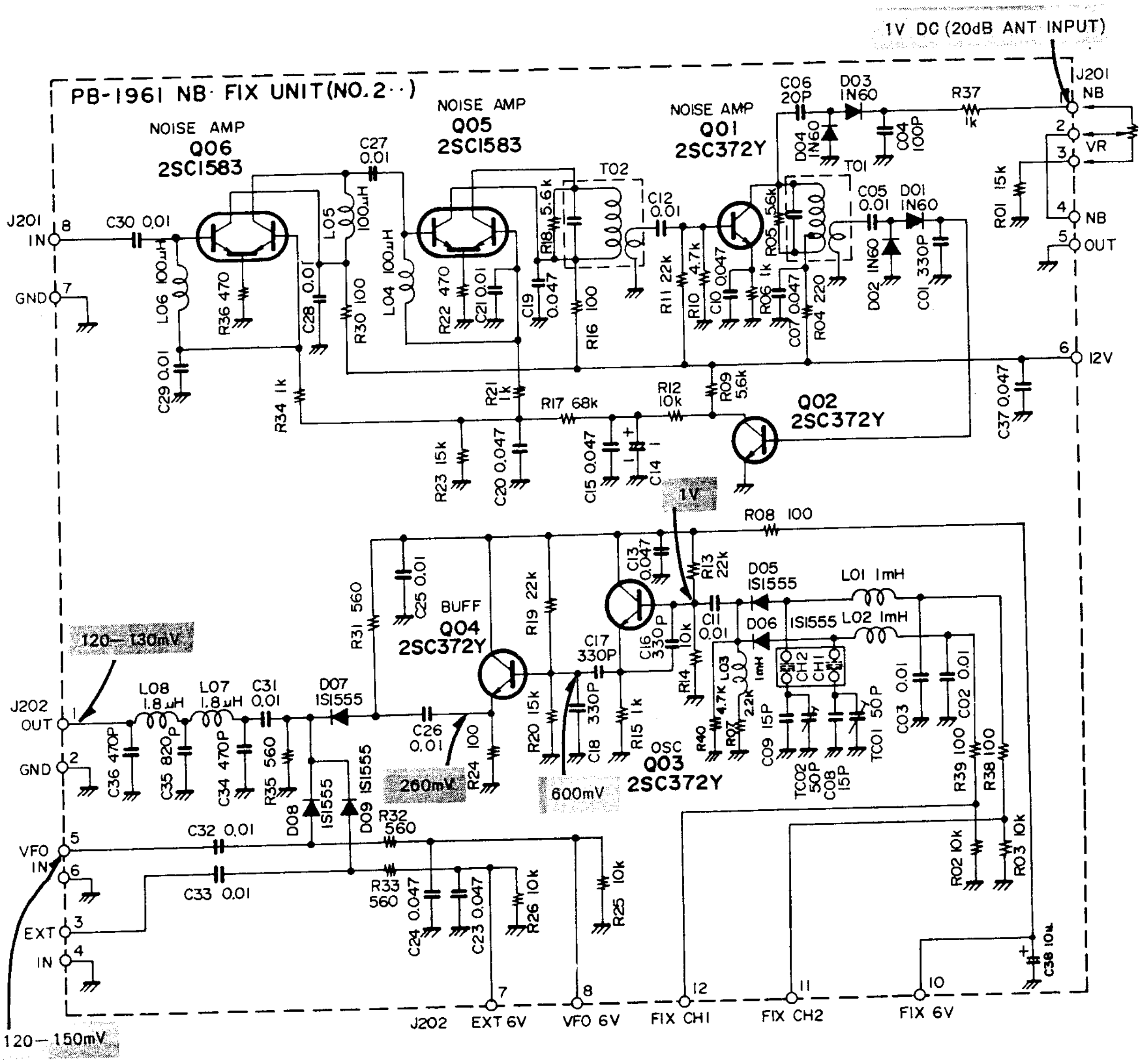



J310




2N4427

# NB/FIX UNIT (PB1961B)



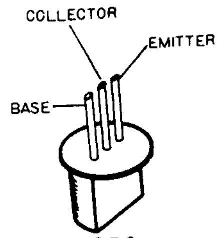

## DC VOLTAGES

(V)

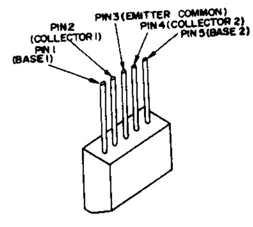
| | E | C | B | |
|---|---|---|---|---|
| $Q_{201}$ | 1.5 | 11.9 | 2.1 | NB ON (NB OFF 0V) |
| $Q_{202}$ | 0 | 11.4 | 0.2 | |
| $Q_{203}$ | 0.8 | 4.7 | 1.4 | FIX ON (FIX OFF 0V) |
| $Q_{204}$ | 1.0 | 4.7 | 1.5 | |

(V)

| | $1(B_1)$ | $2(C_1)$ | 3(E) | $4(C_2)$ | $5(B_2)$ | |
|---|---|---|---|---|---|---|
| $Q_{205}$ | 1.7 | 12.0 | 1.1 | 12.0 | 1.7 | NB ON (NB OFF 0V) |
| $Q_{206}$ | 1.7 | 12.0 | 1.1 | 12.0 | 1.7 | |

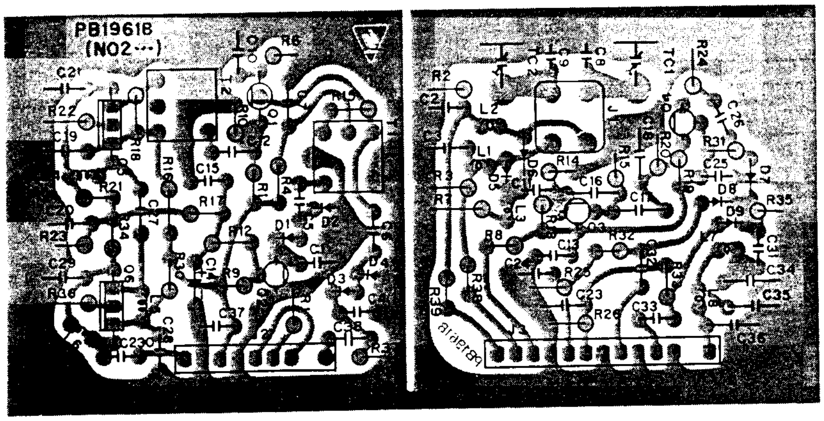



2SC372Y

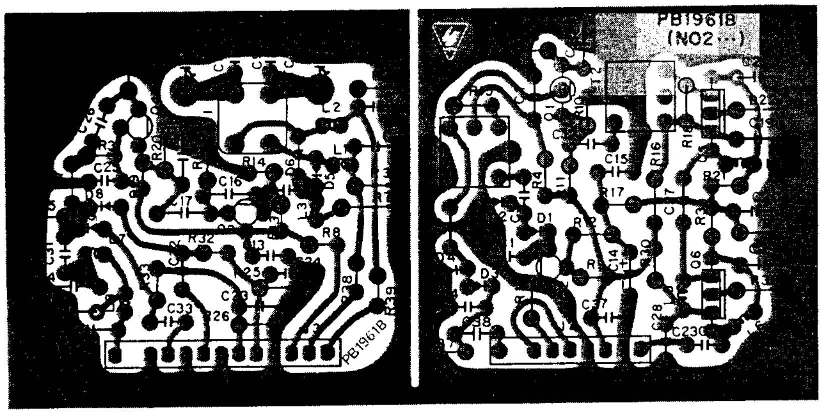



2SC1583

# NB / FIX UNIT PARTS LAYOUT

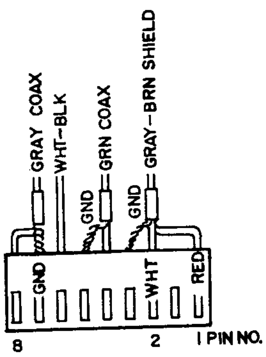


Viewed from component side

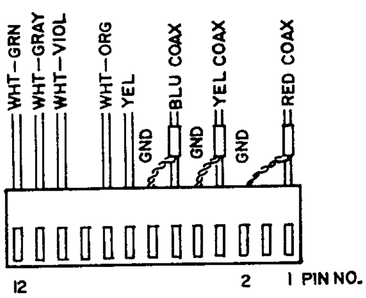


Viewed from solder side





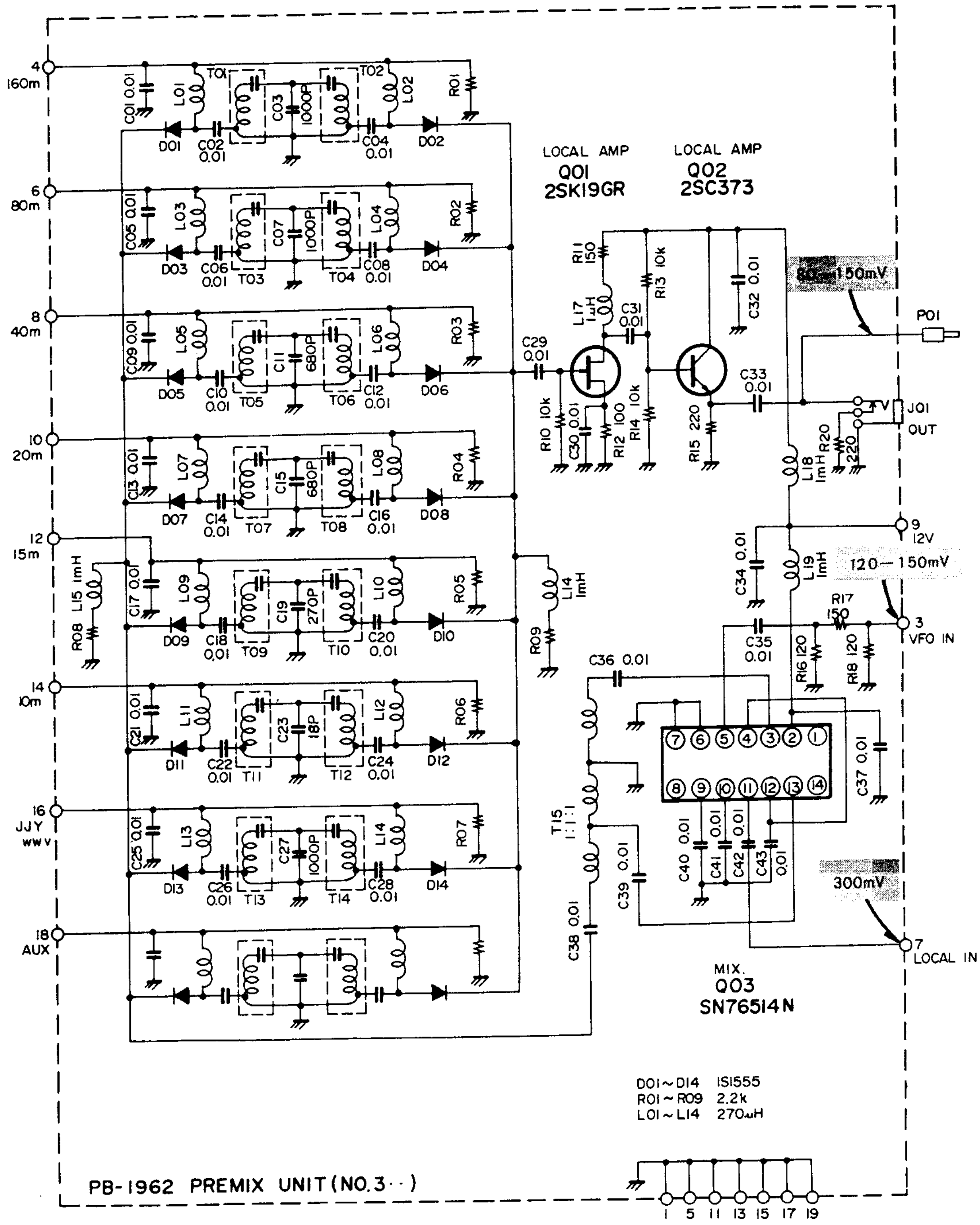

P8 (J201)




P9 (J202)

# PREMIX UNIT (PB1962A)

(Early model) Before Prod. #16




## DC VOLTAGES

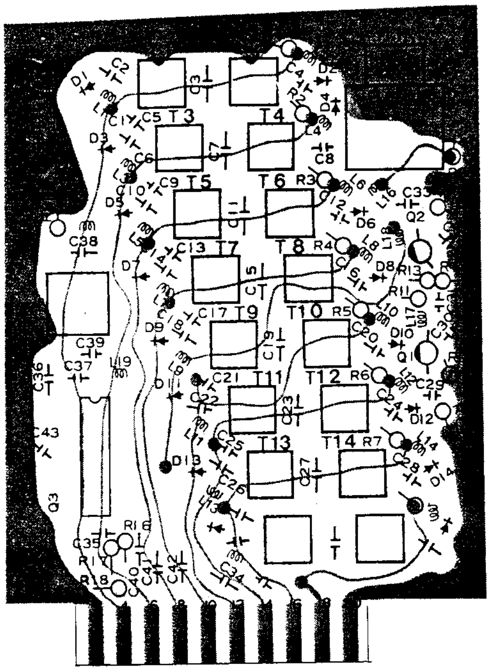
(V)

| | E | C | B |
|---|---|---|---|
| $Q_{301}$ | 0.4 | 11.0 | 0 |
| $Q_{302}$ | 4.4 | 12.0 | 4.8 |

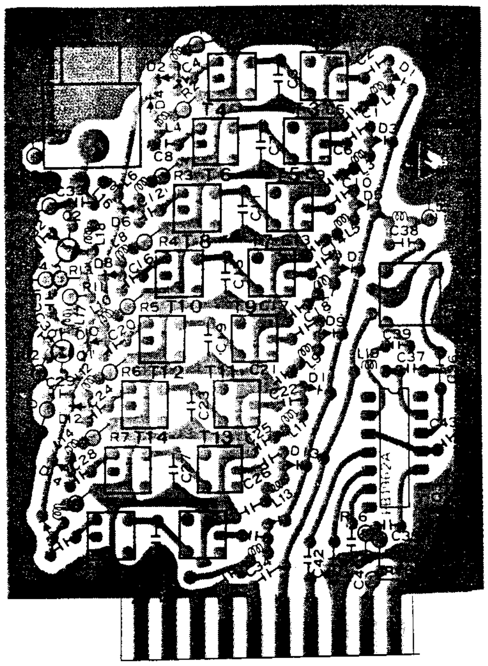
(V)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $Q_{303}$ | 0 | 12.1 | 10.2 | 6.1 | 3.9 | 0 | 0 | 0 | 3.9 | 6.0 | 6.0 | 6.0 | 10.2 | 0 |

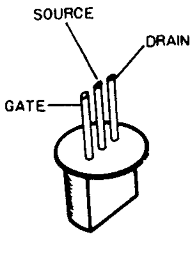
# PREMIX UNIT PARTS LAYOUT



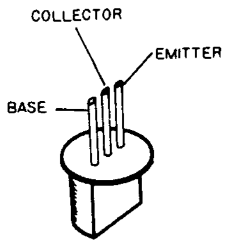
Viewed from component side



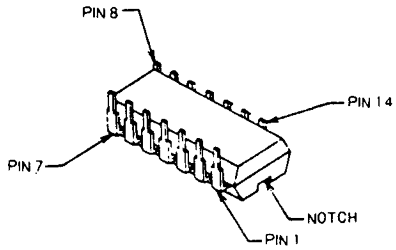
Viewed from solder side




2SK19GR

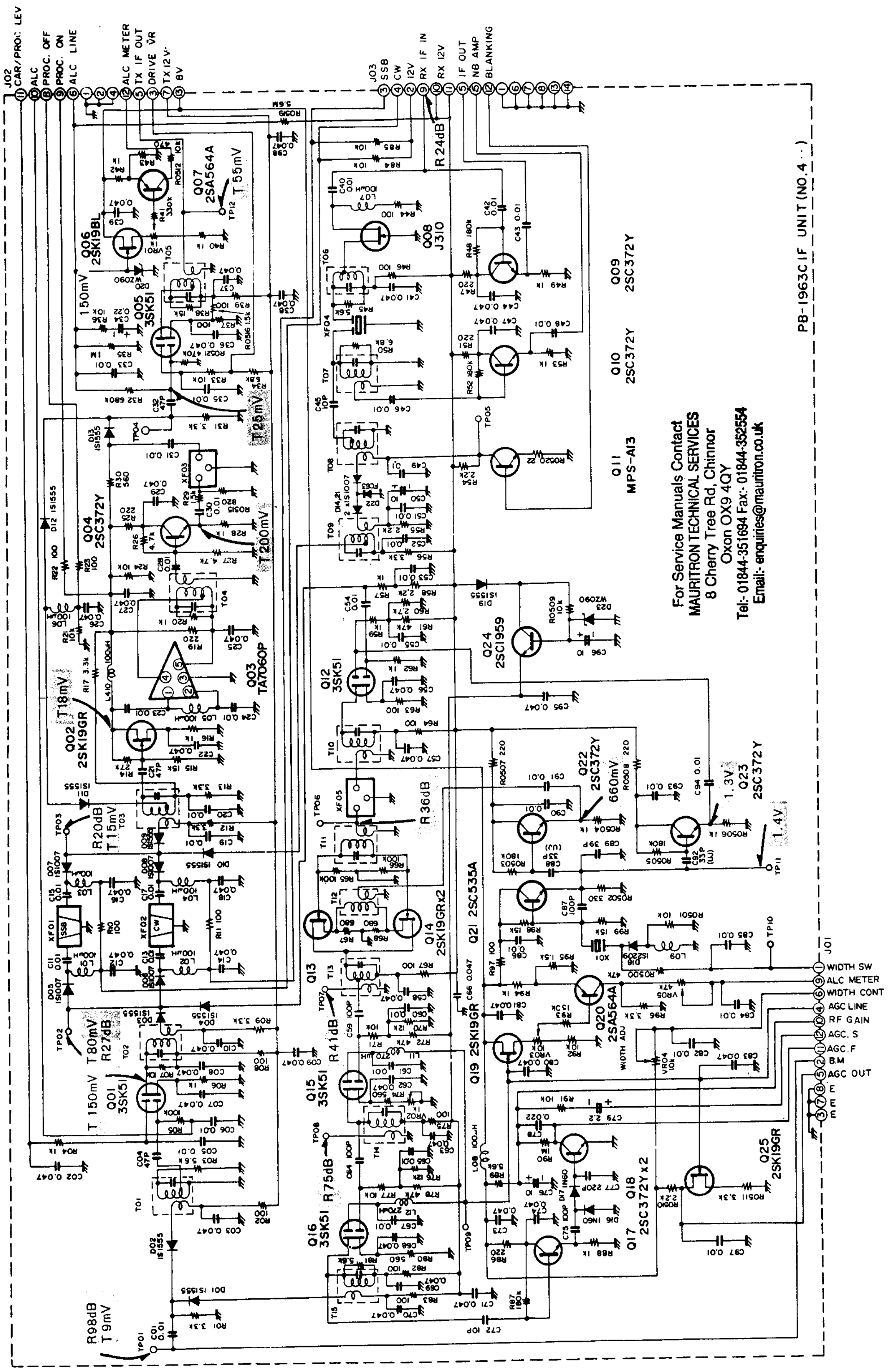



2SC373Y




SN76514N

# IF UNIT (PB-1963C)



# IF UNIT VOLTAGE CHARTS

## DC VOLTAGES

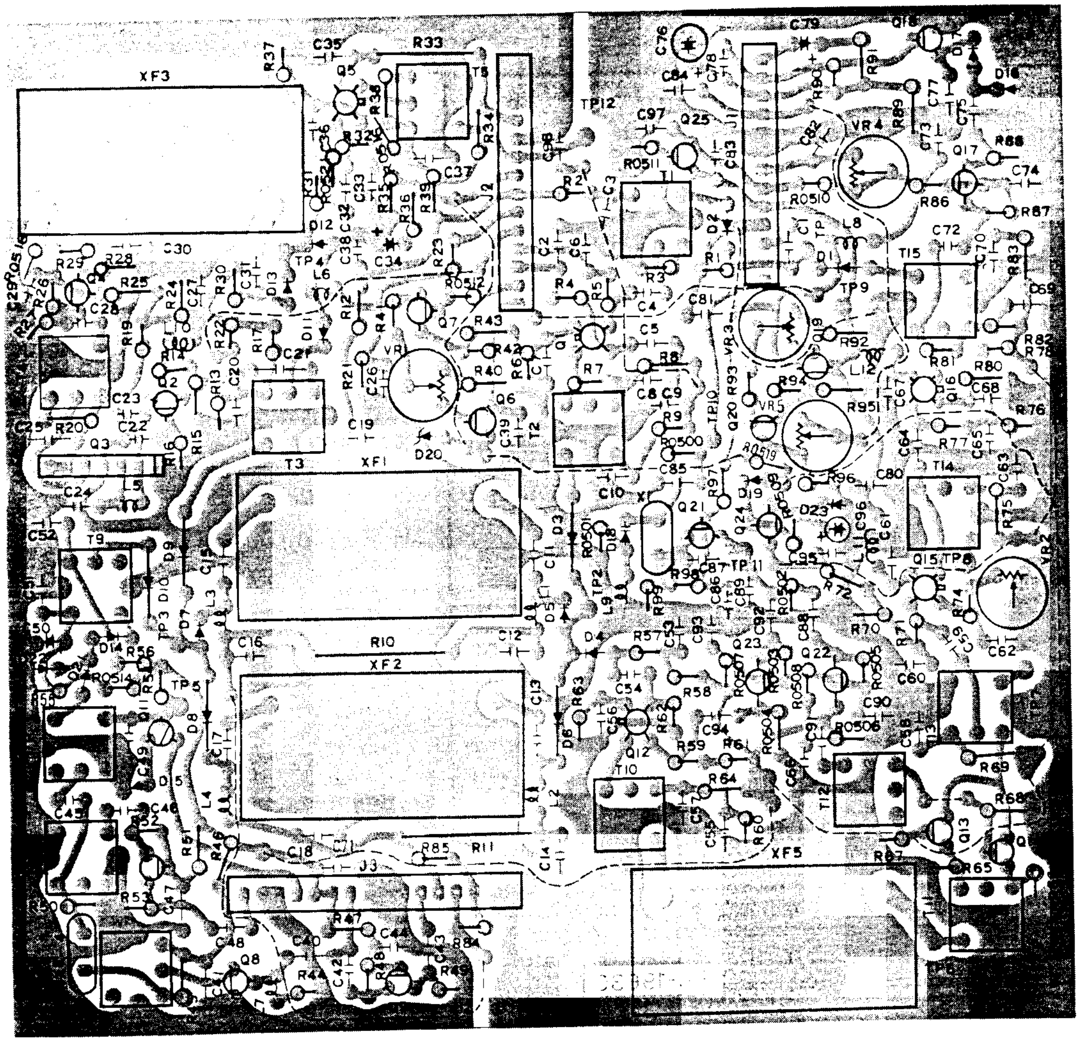
(V)

| | E(S) | | C(D) | | B($G_1$) | | ($G_2$) | | |
|---|---|---|---|---|---|---|---|---|---|
| | R | T | R | T | R | T | R | T | |
| $Q_{401}$ | 0 | 0.8 | 0 | 12.0 | 0 | 0 | 0 | 4.5 | |
| $Q_{402}$ | 4.6 | 4.7 | 10.1 | 10.1 | 3.5 | 3.5 | — | — | PROC ON |
| | 1.5 | 1.3 | 1.7 | 1.7 | 0.6 | 0.6 | — | — | PROC OFF |
| $Q_{404}$ | 3.8 | 4.6 | 9.1 | 8.6 | 4.5 | 4.2 | — | — | PROC ON |
| | 0.2 | 0.3 | 1.6 | 1.8 | 0.8 | 0.9 | — | — | PROC OFF |
| $Q_{405}$ | 0 | 0.9 | 0 | 11.2 | 0 | 0 | 0 | 4.5 | DRIVE MAX |
| $Q_{406}$ | 3.0 | 3.0 | 8.1 | 8.1 | 0 | 0 | — | — | |
| $Q_{407}$ | 2.6 | 2.6 | * 1.3 | * 1.3 | 2.0 | 2.0 | — | — | METER ALC (* IC, PO 2.1V) |
| $Q_{408}$ | 1.3 | 0 | 10.9 | 0 | 0 | 0 | — | — | |
| $Q_{409}$ | 5.5 | 0 | 11.0 | 0 | 5.3 | 0 | — | — | |
| $Q_{410}$ | 5.6 | 0 | 11.0 | 0 | 5.4 | 0 | — | — | |
| $Q_{411}$ | 0 | 0 | 6.4 | 0 | ** 0.5 | ** 0.4 | — | — | NB ON (** NB OFF 0V) |
| $Q_{412}$ | 0.2 | 0 | 12.0 | 0 | 0 | 0 | 0.6 | 0.6 | |
| $Q_{413}$ | 1.7 | 0 | 11.7 | 0 | 0 | 0 | — | — | |
| $Q_{414}$ | 1.7 | 0 | 11.7 | 0 | 0 | 0 | — | — | |
| $Q_{415}$ | 2.4 | 0 | 10.2 | 0 | 1.7 | 0 | *** 1.2 | *** 1.2 | RF GAIN MAX (*** AGC OFF 3.6V) |
| $Q_{416}$ | 2.3 | 0 | 10.0 | 0 | 1.7 | 0 | *** 1.2 | *** 1.2 | 〃 ( 〃 ) |
| $Q_{417}$ | 3.0 | 3.0 | 7.5 | 7.5 | 3.3 | 3.3 | — | — | |
| $Q_{418}$ | 0 | 0 | 1.2 | 1.2 | 0 | 0 | — | — | RF GAIN MAX |
| $Q_{419}$ | 6.2 | 6.2 | 8.1 | 8.1 | 1.2 | 1.2 | — | — | 〃 |
| $Q_{420}$ | 4.9 | 4.9 | 0 | 0 | 3.8 | 3.8 | — | — | 〃 |
| $Q_{421}$ | 2.2 | 2.2 | 7.4 | 7.4 | 2.5 | 2.5 | — | — | |
| $Q_{422}$ | 4.0 | 0 | 11.3 | 0 | 4.9 | 0 | — | — | |
| $Q_{423}$ | 4.2 | 0 | 11.2 | 0 | 4.7 | 0 | — | — | |
| $Q_{424}$ | 10.4 | 0 | 11.5 | 0 | 10.5 | 0 | — | — | |
| $Q_{425}$ | 4.7 | 4.7 | 4.9 | 4.9 | 1.2 | 1.2 | — | — | RF GAIN MAX |

(V)

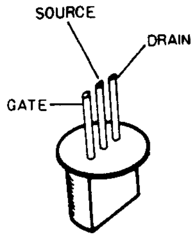
| | | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|---|
| $Q_{403}$ | R | 1.5 | 1.5 | 0 | 9.5 | 9.5 | PROC ON |
| | T | 1.5 | 1.5 | 0 | 9.3 | 9.3 | PROC ON |
| | R | 1.3 | 1.3 | 0 | 1.7 | 1.7 | PROC OFF |
| | T | 1.3 | 1.3 | 0 | 1.8 | 1.8 | PROC OFF |

# IF UNIT PARTS LAYOUT (1)

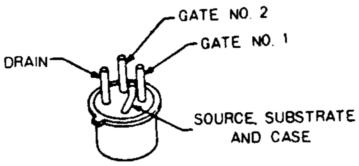




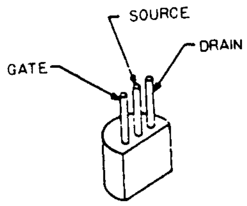
Viewed from component side



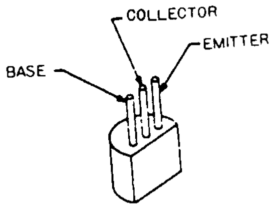

2SK19BL
2SK19GR



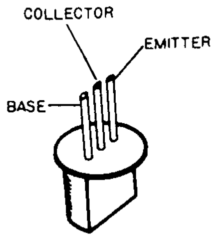

3SK51-03



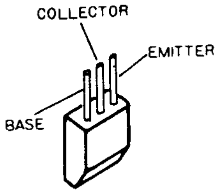

J310



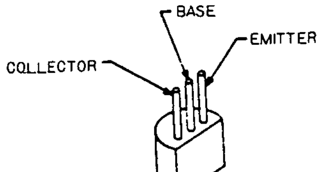

2SA564A



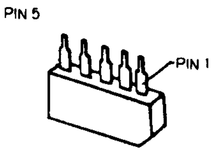

2SC372Y




2SC535A

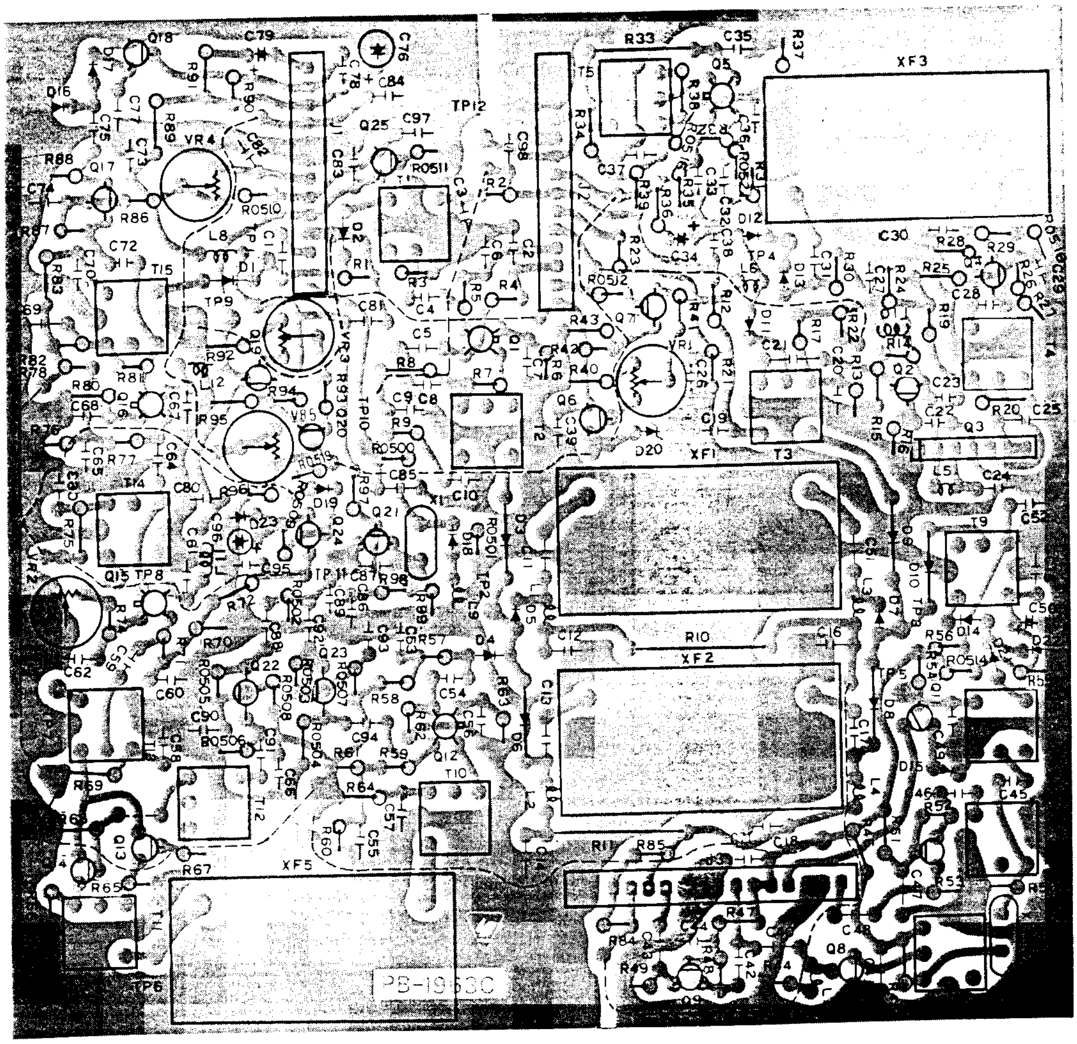



MPSA13

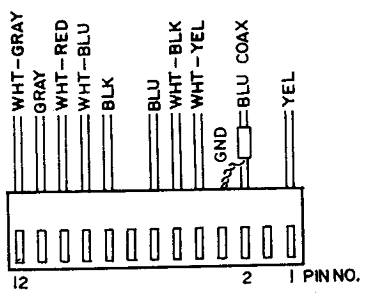



TA7060P

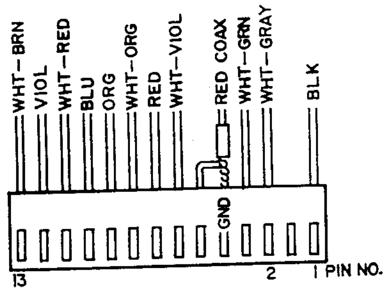
# IF UNIT PARTS LAYOUT (2)



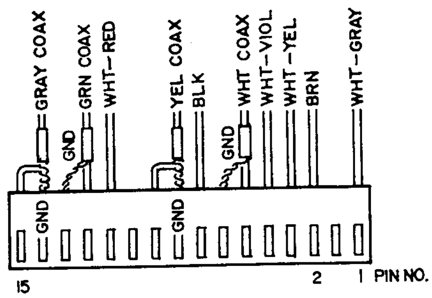
Viewed from solder side




P1 (J401)

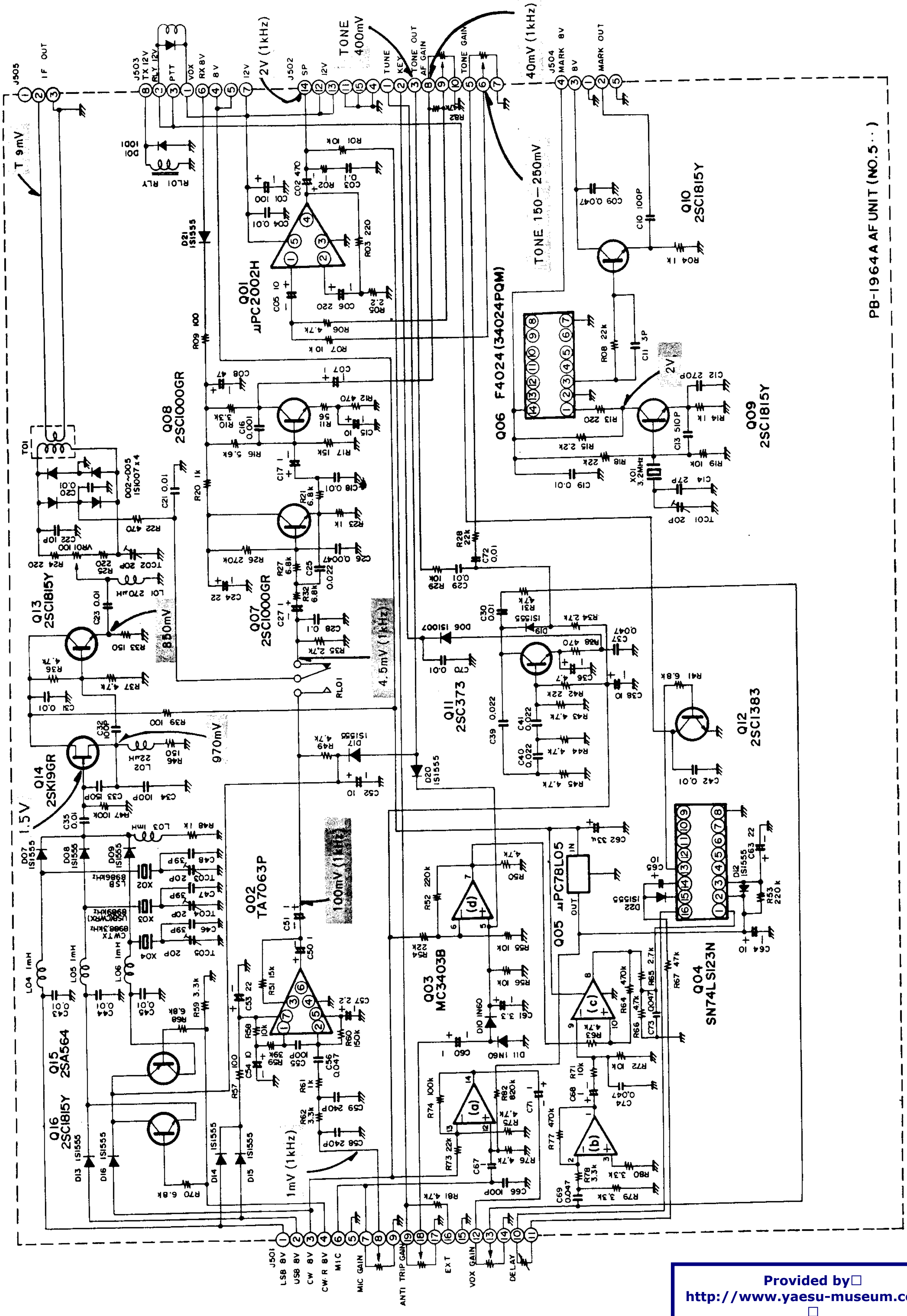



P2 (J402)




P3 (J403)

# AF UNIT (PB-1964)



# AF UNIT VOLTAGE CHARTS

## DC VOLTAGES

(V)

| | E(S) | | C(D) | | B(G) | | |
|---|---|---|---|---|---|---|---|
| | R | T | R | T | R | T | |
| $Q_{507}$ | 2.2 | 0 | 4.8 | 0 | 2.4 | 0 | |
| $Q_{508}$ | 1.4 | 0 | 1.6 | 0 | 0.8 | 0 | |
| ★★ $Q_{509}$ | 1.8 | 1.8 | 3.5 | 3.5 | 2.4 | 2.4 | MARKER ON |
| $Q_{510}$ | ★★ 5.5 | ★★ 5.5 | 8.2 | 8.2 | ★★ 3.6 | ★★ 3.6 | 〃 〃 |
| $Q_{511}$ | 0.9 | 0.7 | 7.7 | 6.1 | 1.4 | 1.4 | CW KEY DOWN (MARK) |
| | 0.9 | 0.7 | 7.7 | 7.7 | 1.4 | 1.4 | 〃 UP (SPACE) |
| $Q_{512}$ | 0 | 0 | 12.2 | 0 | 0.12 | 0.7 | PTT SW TRANSMIT |
| | 0 | 0 | 12.2 | 0.2 | 0.12 | 0.7 | VOX TRANSMIT |
| $Q_{513}$ | 2.4 | 2.4 | 6.0 | 6.0 | 2.8 | 2.8 | |
| $Q_{514}$ | 0.9 | 0.9 | 6.0 | 6.0 | 0 | 0 | |
| $Q_{515}$ | 7.4 | 7.4 | 7.4 | 7.4 | 6.7 | 6.7 | TUNE |
| | 7.4 | 7.4 | 0 | 7.4 | 8.0 | 6.7 | CW |
| $Q_{516}$ | 1.7 | 1.7 | 7.4 | 7.4 | 2.1 | 2.1 | TUNE |
| | 7.2 | 7.2 | 7.4 | 7.4 | 7.8 | 1.7 | CW |

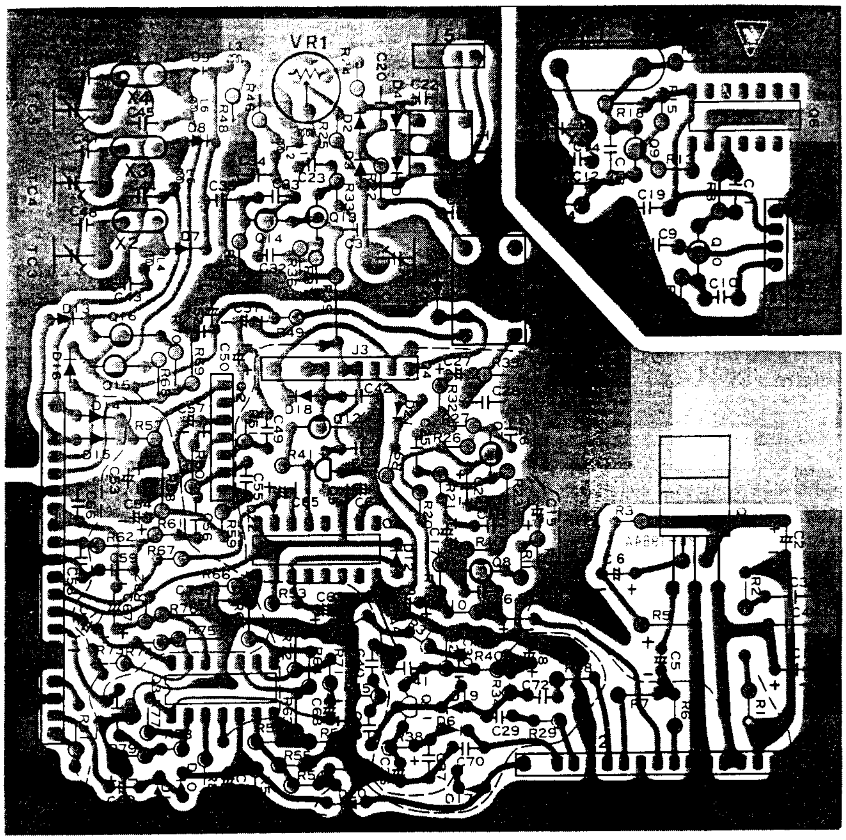


(V)

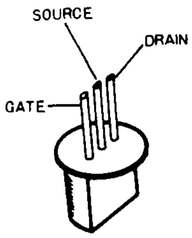
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $Q_{501}$ | 0.5 | 0.7 | 0 | 5.6 | 12.2 | — | — | — | — | — | — | — | — | — | — | — |
| ★ $Q_{502}$ | 1.3 | 0.6 | 0.02 | 0 | 0.7 | 4.8 | 7.3 | — | — | — | — | — | — | — | — | — |
| $Q_{503}$ | 0 | 0 | 0 | 8.1 | 7.5 | 0.1 | 6.7 | 6.7 | 0 | 6.6 | 0 | 0 | 0 | 1.0 | — | — |
| $Q_{504}$ | 4.2 | 5.0 | 3.5 | 4.3 | 0.1 | 0 | 0.4 | 0 | 1.2 | 0 | 5.0 | 4.3 | 0.1 | 0 | 1.2 | 5.0 |
| $Q_{505}$ | 8.1 | 0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| ★★ $Q_{506}$ | 3.7 | 0 | 3.2 | 3.0 | 3.0 | 2.9 | 0 | 0 | 2.9 | 0 | 3.0 | 3.0 | 0 | 8.1 | — | — |

★SSB(CW 0V) ★★MARKER ON(OFF 0V)

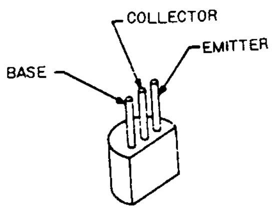
# AF UNIT PARTS LAYOUT (1)



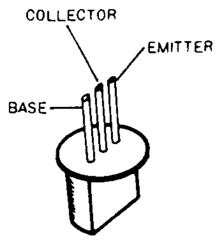

Viewed from component side



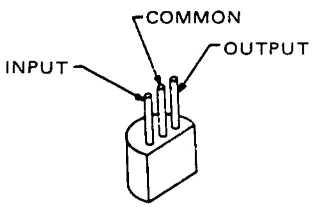

2SK19GR



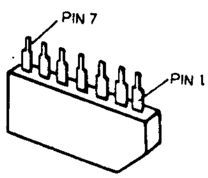

2SA564A
2SC1383
2SC1815Y



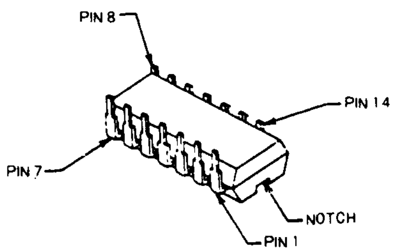

2SC373
2SC1000GR



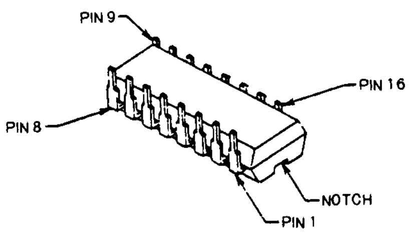

μPC78L05



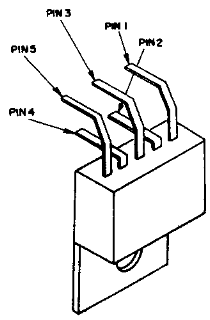

TA7063P




34024PCQM

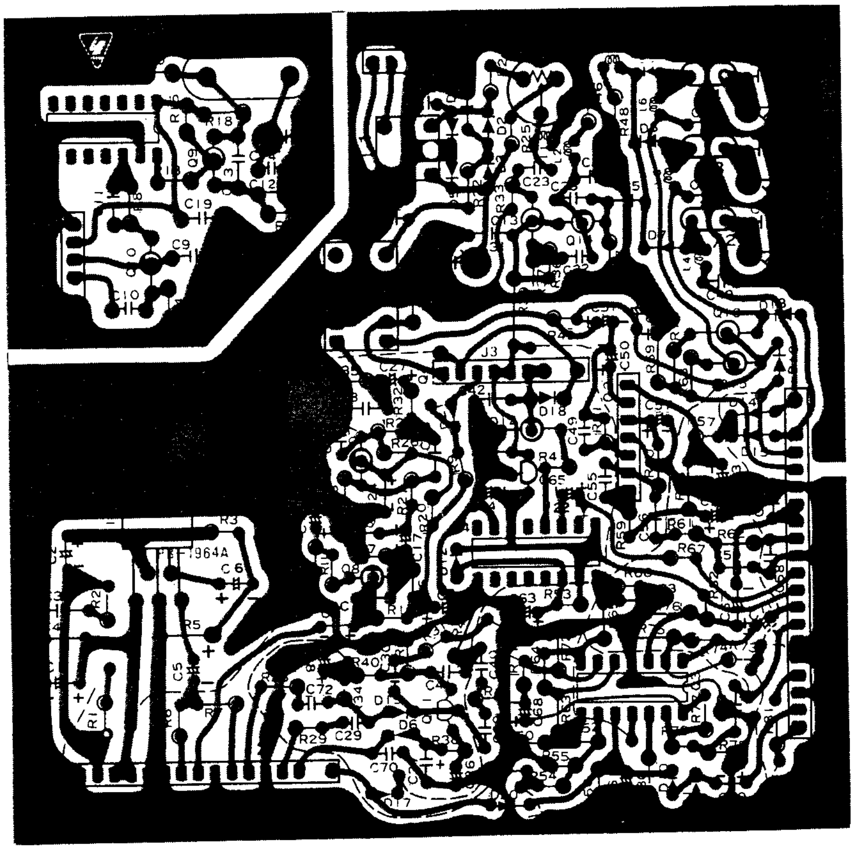



SN74LS123N



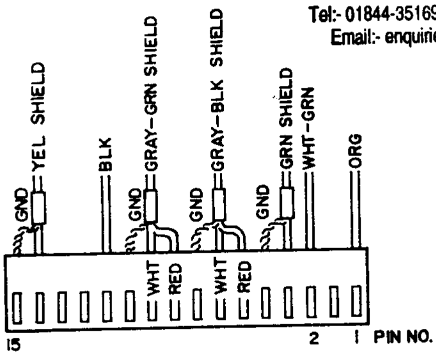

μPC2002H

# AF UNIT PARTS LAYOUT (2)

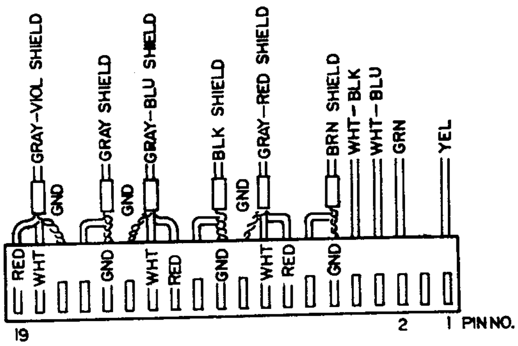




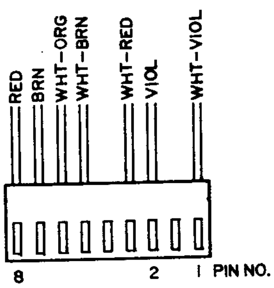
Viewed from solder side



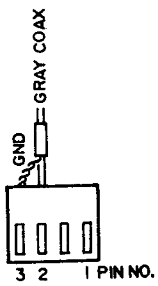

P5(J502)



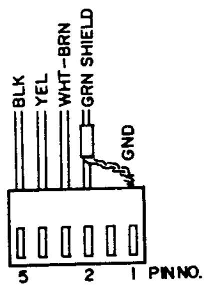

P4(J501)




P6(J503)



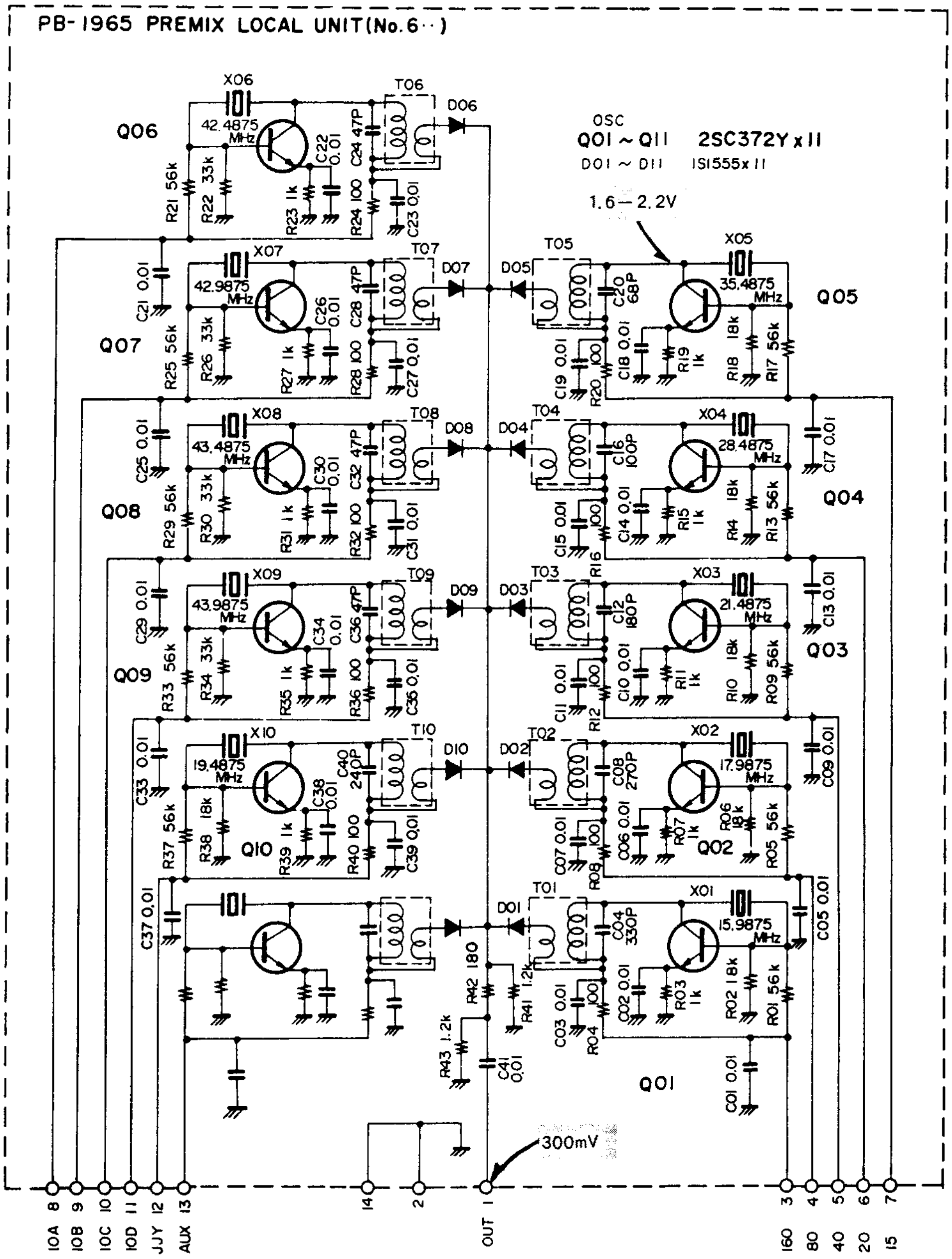

P18(J505)




P7(J504)

# PREMIX LOCAL UNIT (PB1965)

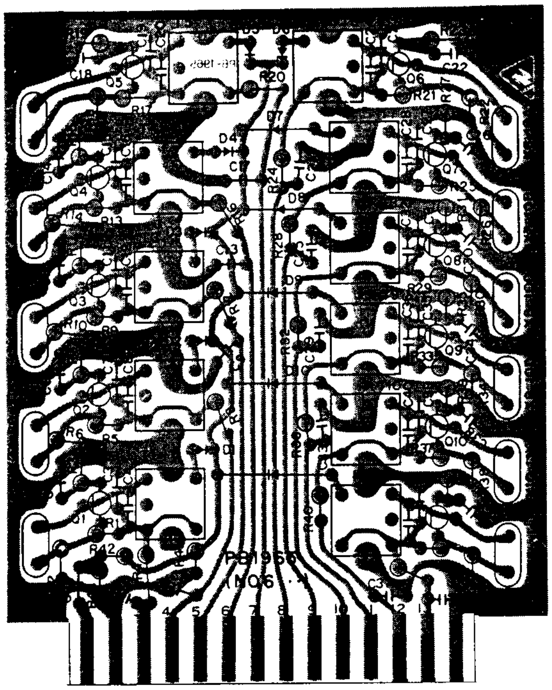
(Prod. #01 ~ #16)



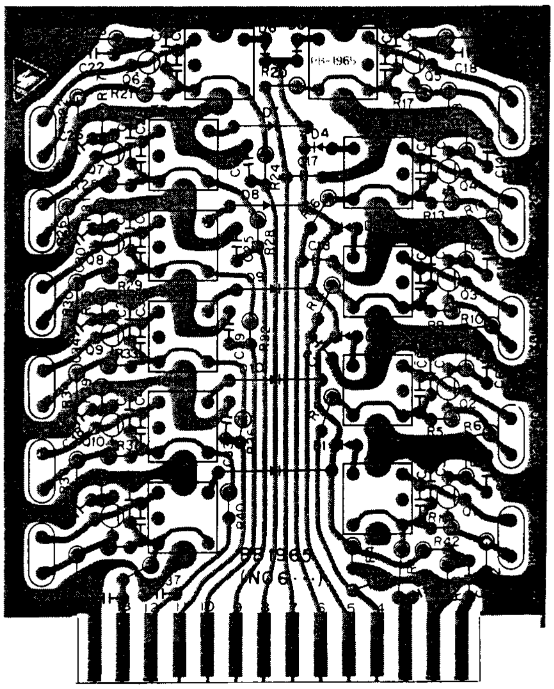

## DC VOLTAGES (V)

| | E | C | B |
|---|---|---|---|
| $Q_{601}$ | 3.1 | 6.7 | 1.5 |
| $Q_{602}$ | 3.1 | 6.7 | 1.5 |
| $Q_{603}$ | 3.0 | 6.7 | 1.5 |
| $Q_{604}$ | 2.6 | 6.7 | 1.5 |
| $Q_{605}$ | 2.5 | 6.7 | 1.0 |
| $Q_{606}$ | 1.9 | 6.7 | 1.3 |
| $Q_{607}$ | 2.8 | 6.6 | 1.9 |
| $Q_{608}$ | 2.7 | 6.6 | 2.1 |
| $Q_{609}$ | 2.5 | 6.6 | 1.7 |
| $Q_{610}$ | 3.2 | 6.7 | 1.5 |
| $Q_{611}$ | 2.6 | 6.7 | 1.5 |

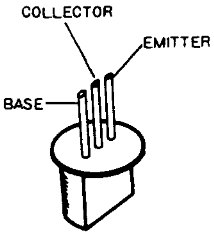
# PREMIX LOCAL UNIT PARTS LAYOUT



Viewed from component side



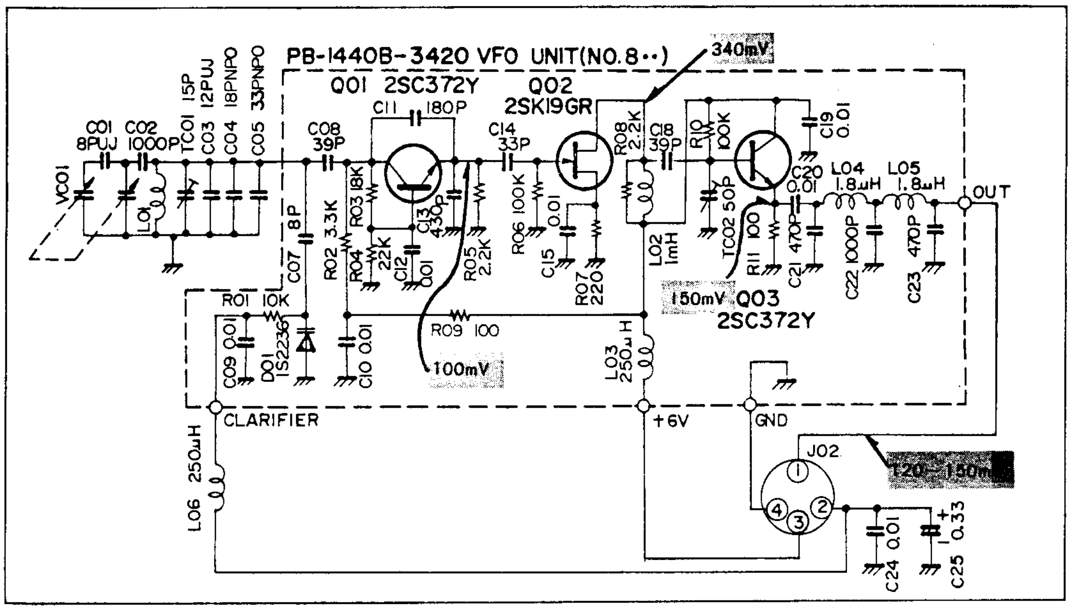
Viewed from solder side

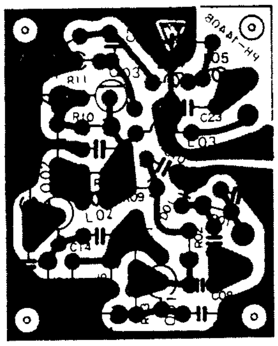



2SC372Y

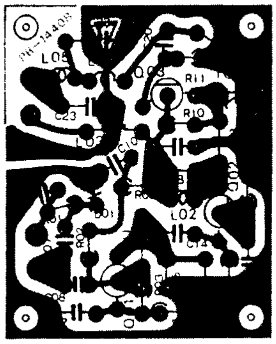
# VFO ASSEMBLY

## VFO BOARD (PB-1440B-3420)



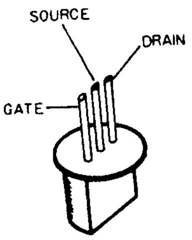
Viewed from component side



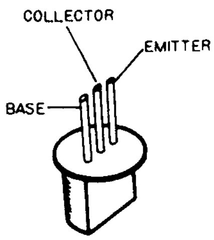
Viewed from solder side

### DC VOLTAGES (V)

| | E(S) | C(D) | B(G) |
|---|---|---|---|
| Q801 | 1.4 | 3.7 | 1.9 |
| Q802 | 0.9 | 6.0 | 0 |
| Q803 | 0.9 | 6.0 | 1.6 |

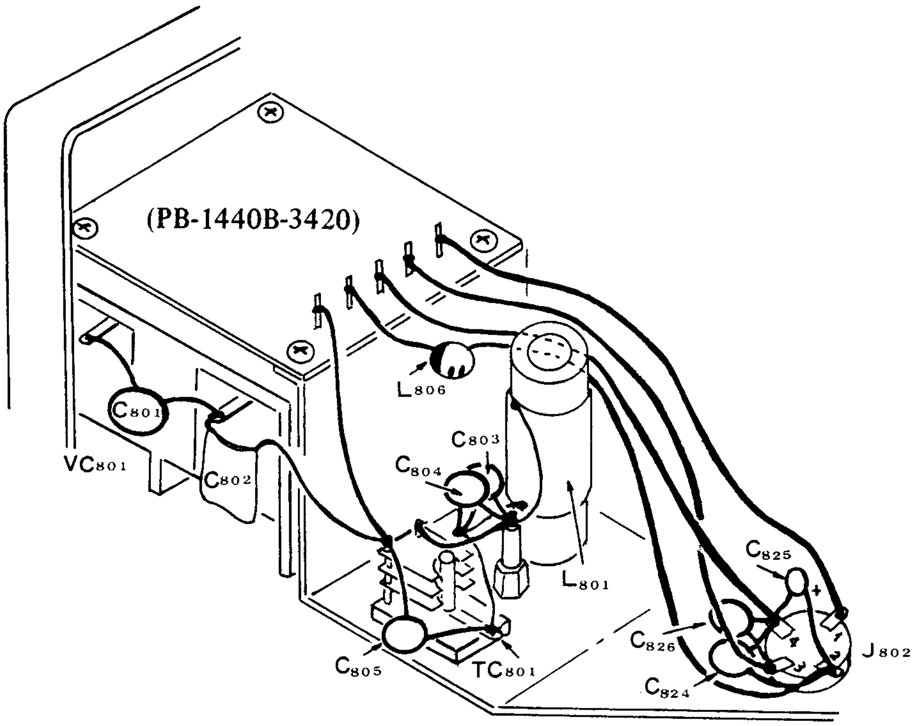



2SK19GR



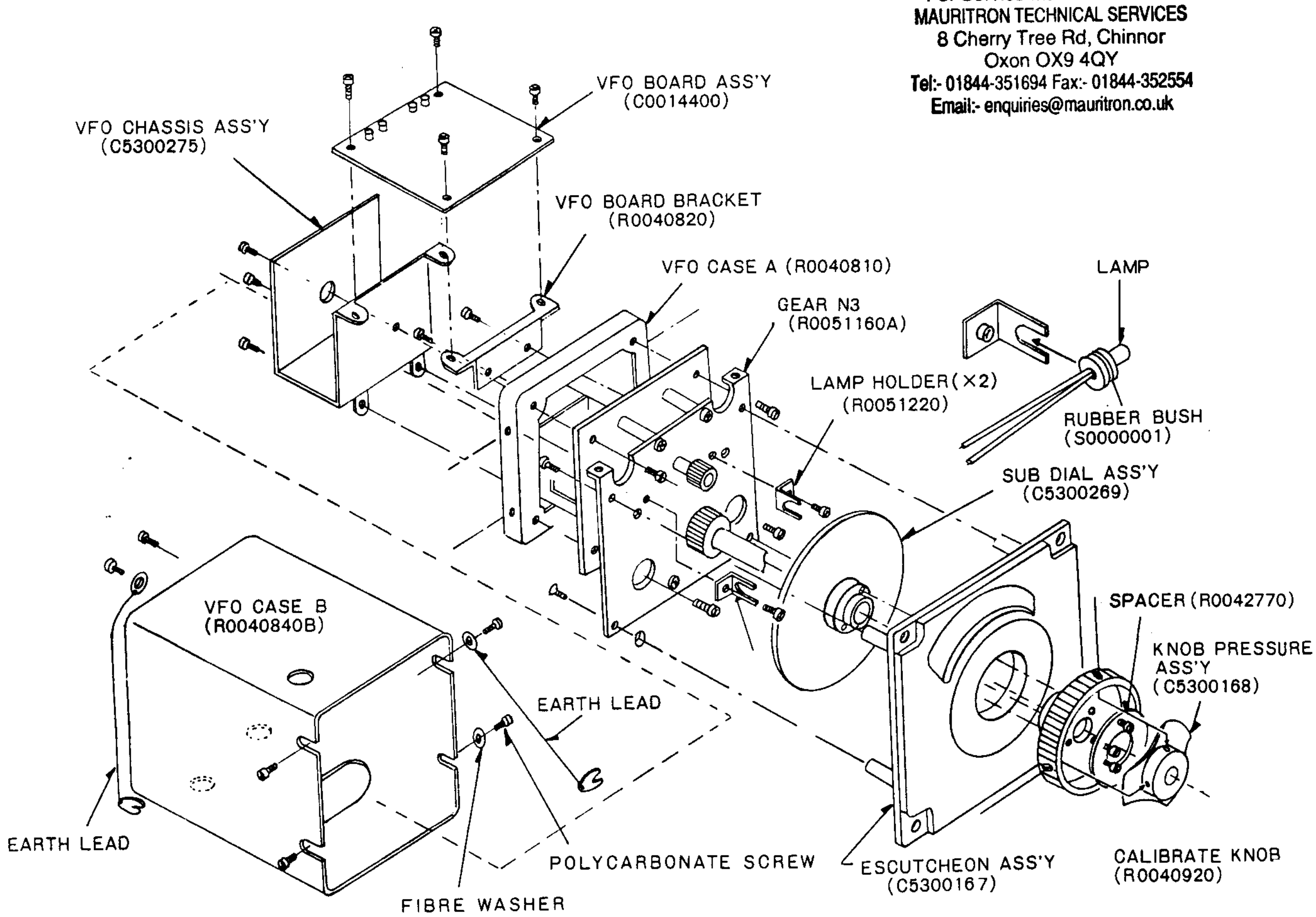

2SC372Y

# VFO ASSEMBLY PARTS LAYOUT

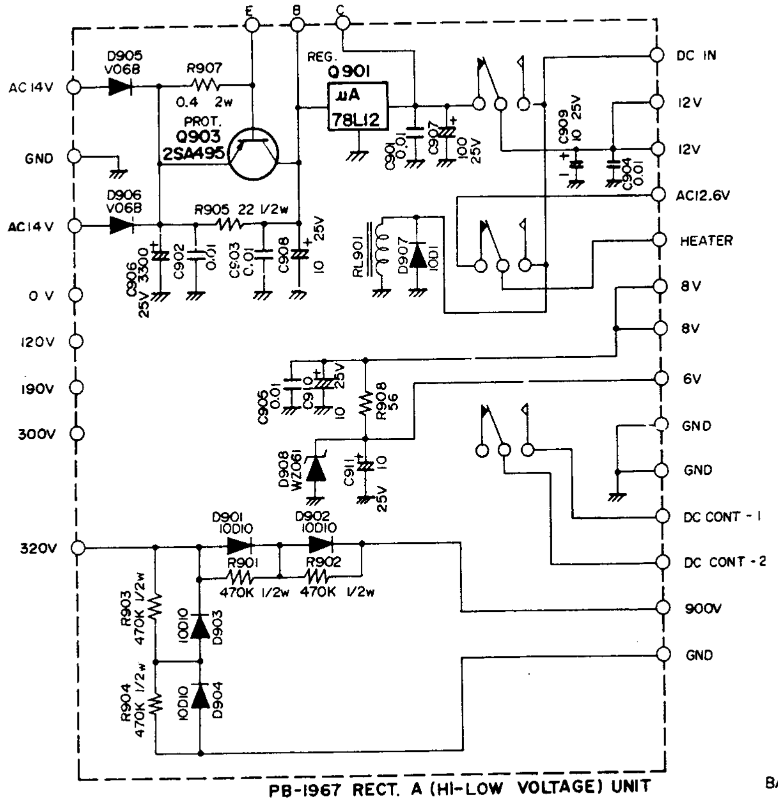



# VFO UNIT EXPLODED VIEW





# RECT A UNIT (HIGH/LOW VOLTAGES) UNIT (PB-1967)




## DC VOLTAGES

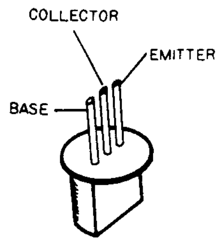
(V)

| | IN | OUT |
|---|---|---|
| $Q_{901}$ | ★18.1 | 12.0 |

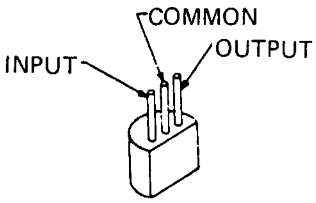
RECEIVE(★TRANSMIT 17.4V)

(V)

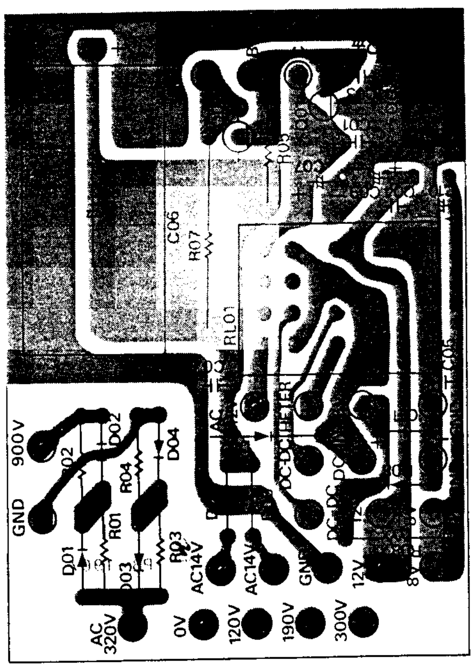
| | | E | C | B |
|---|---|---|---|---|
| $Q_{903}$ | R | 19.0 | 18.1 | 18.7 |
| | T | 18.5 | 17.4 | 18.2 |



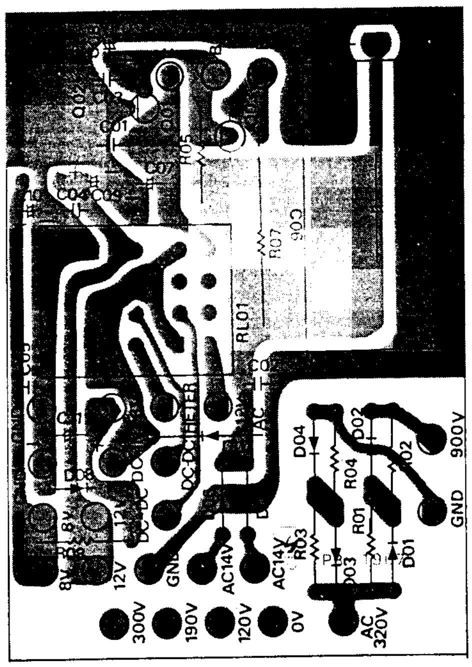

2SA495




µA78L08

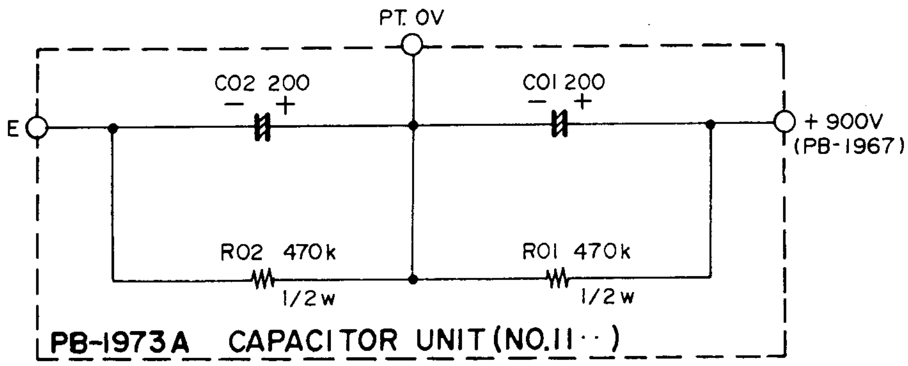


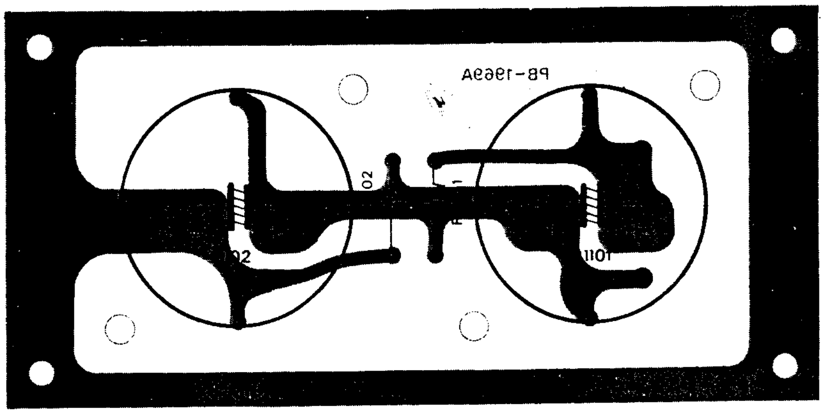

Viewed from component side



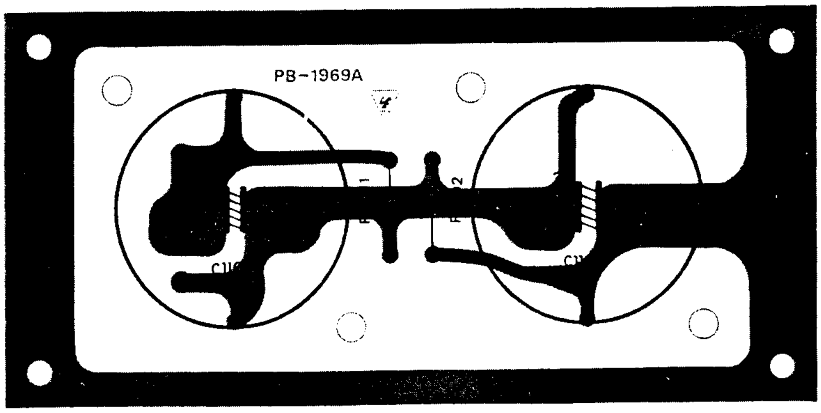

Viewed from solder side

# CAPACITOR UNIT (PB-1969A)



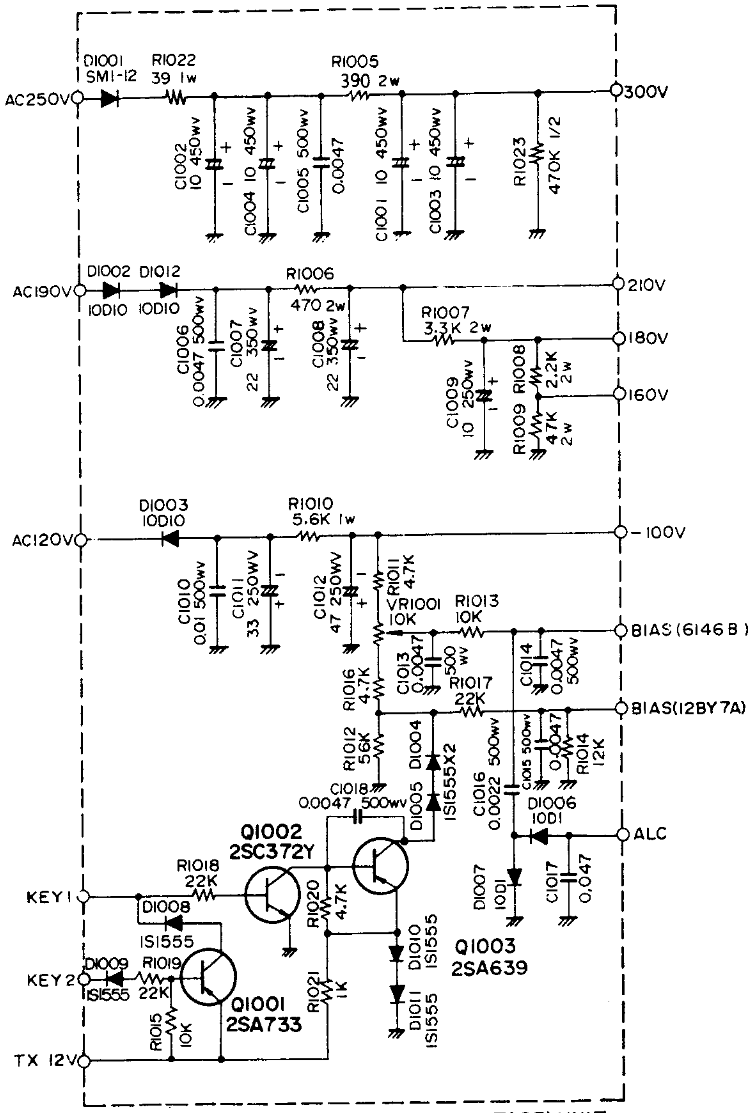




Viewed from component side




Viewed from solder side

# RECT B (MEDIUM/BIAS VOLTAGES) UNIT (PB-1968B)

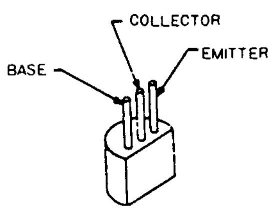



PB-1968 RECT. B( M. BIAS VOLTAGE) UNIT

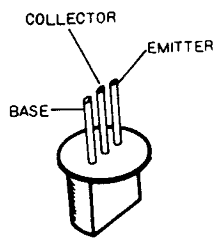
## DC VOLTAGES

(V)

| | E | | C | | B | | |
|---|---|---|---|---|---|---|---|
| | R | T | R | T | R | T | |
| Q1001 | 0 | 12.2 | 0 | 12.1 | 0 | 11.5 | KEY UP |
| | 0 | 12.2 | 0 | 0 | 0 | 11.9 | KEY DOWN |
| Q1002 | 0 | 0 | 0 | 1.5 | 0 | 0 | KEY UP |
| | 0 | 0 | 0 | 0 | 0 | 0.7 | KEY DOWN |
| Q1003 | 0 | 1.5 | −84 | −84 | 0 | 1.5 | KEY UP |
| | 0 | 0.8 | −84 | .0.8 | 0 | 0 | KEY DOWN |

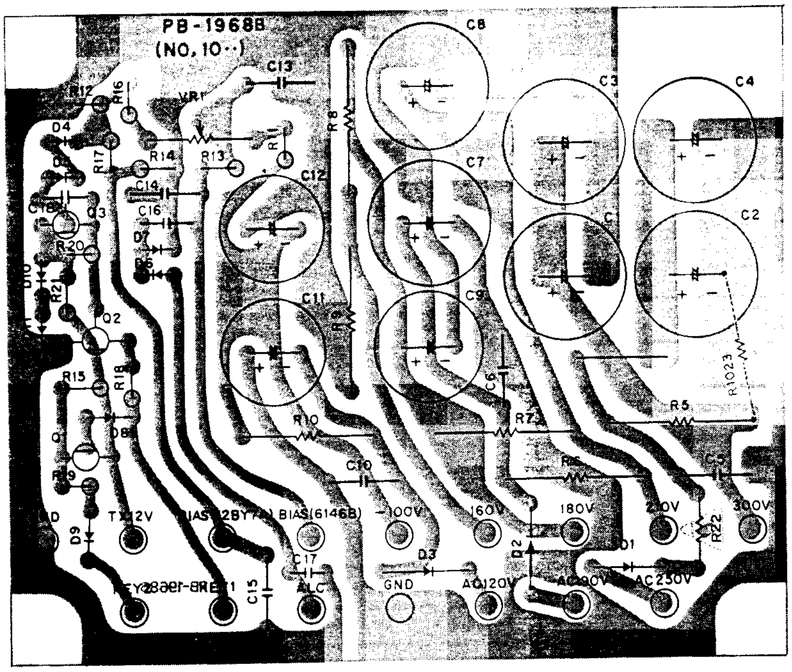



2SA639
2SA733



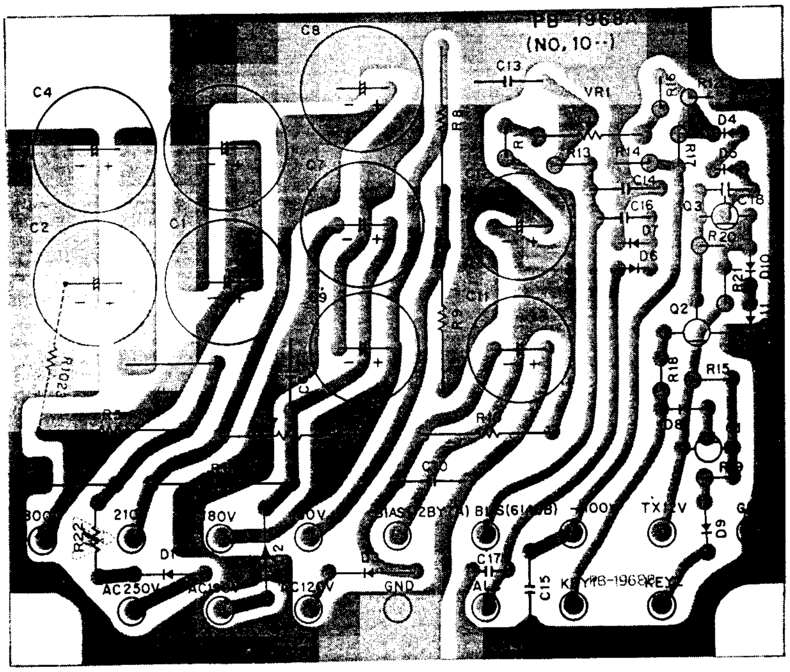

2SC372Y

# RECT B UNIT PARTS LAYOUT





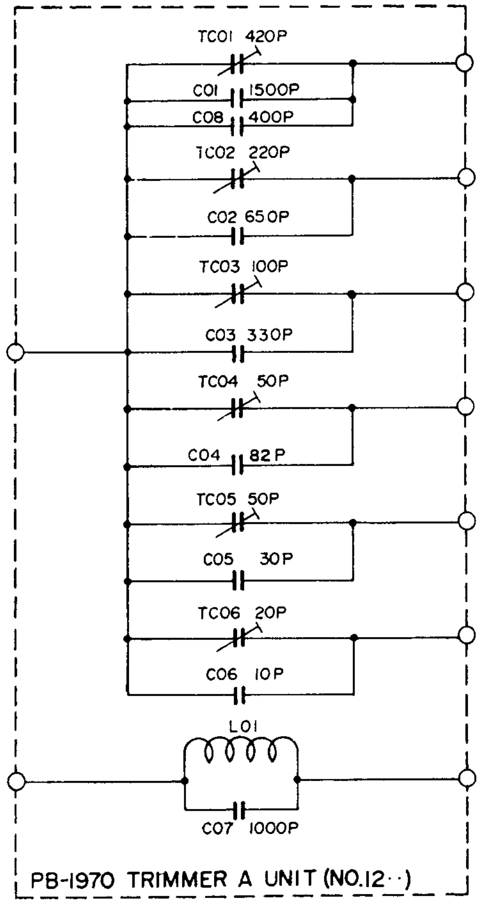
Viewed from component side

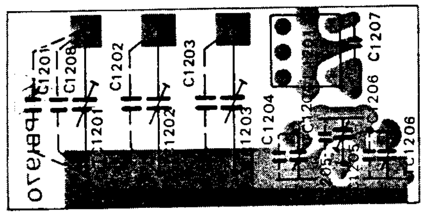


Viewed from solder side

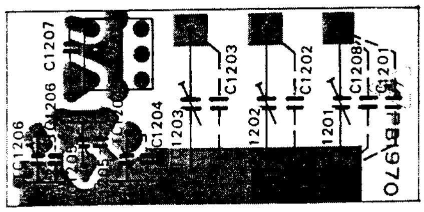
## TRIMMER A BOARD (PB-1970Ⓐ)

(Early model) Before Prod. #16



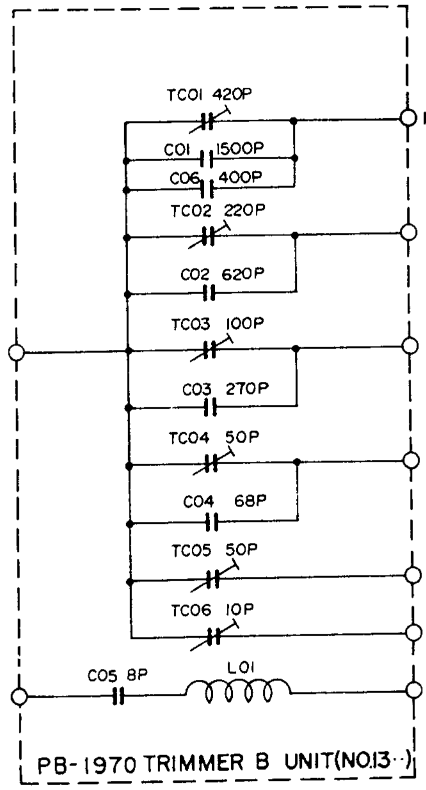
Viewed from component side

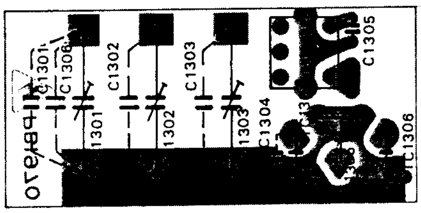


Viewed from solder side

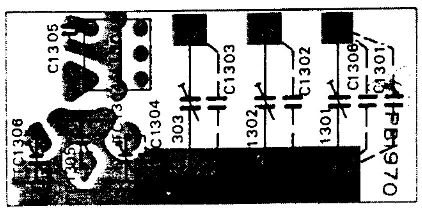
## TRIMMER B BOARD (PB-1970Ⓑ)

(Early model) Before Prod. #16



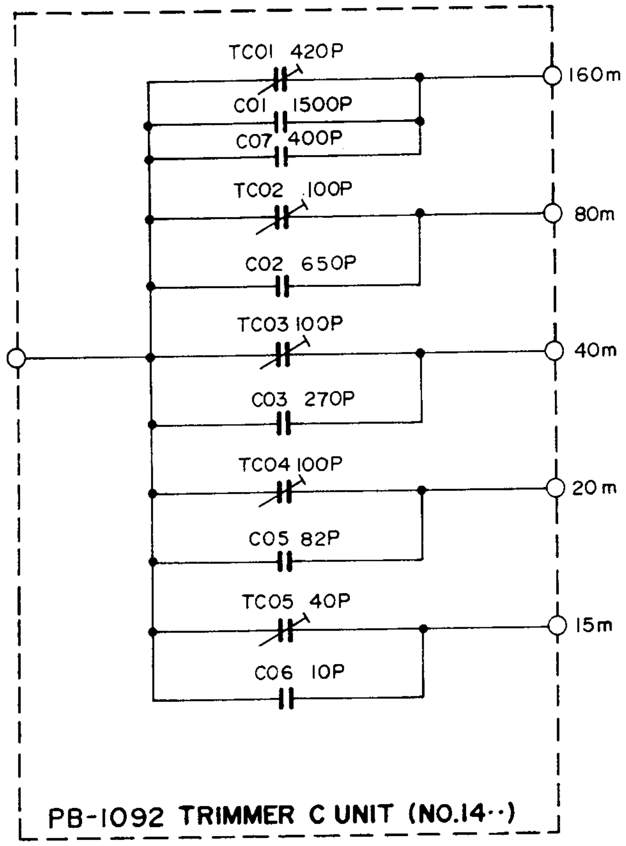



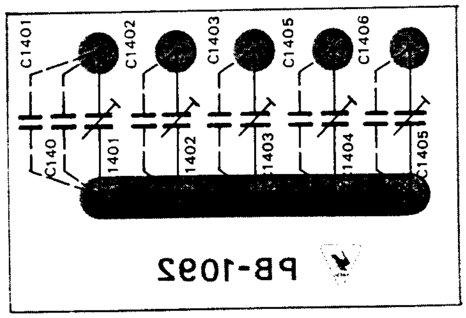
Viewed from component side



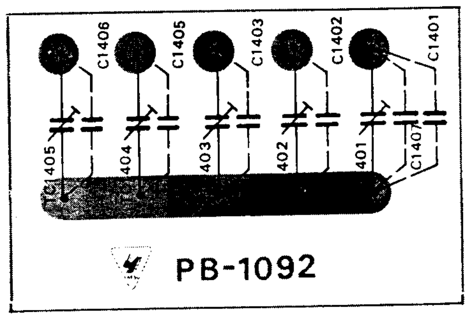
Viewed from solder side

# TRIMMER C BOARD (PB-1092)



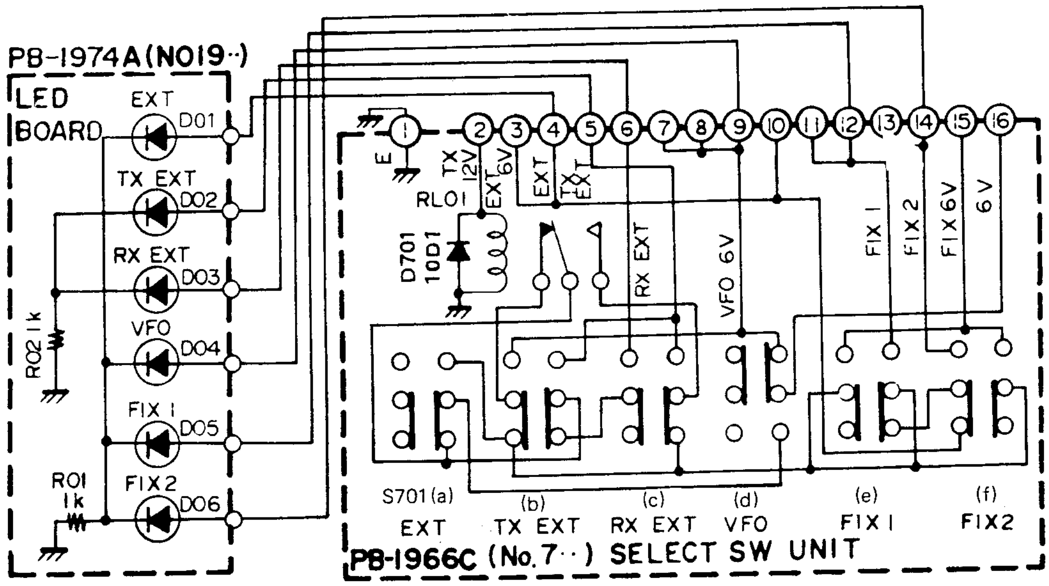



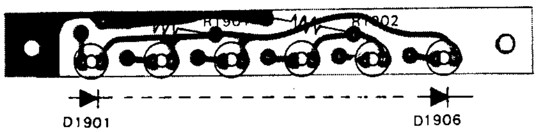

Viewed from component side

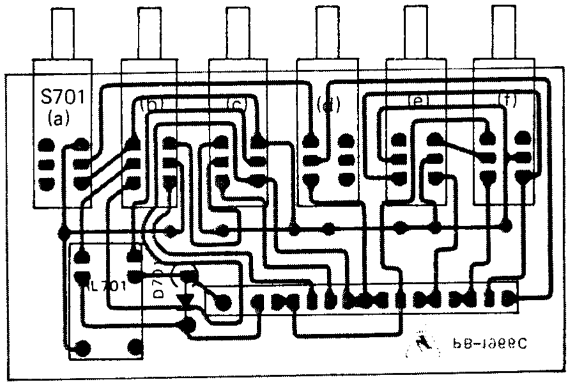


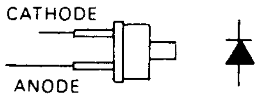

Viewed from solder side

# LED UNIT(PB-1974A) SELECT SWITCH UNIT(PB-1966C)



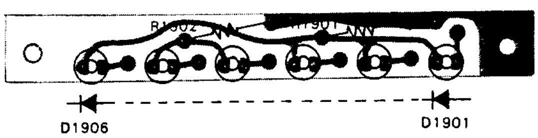



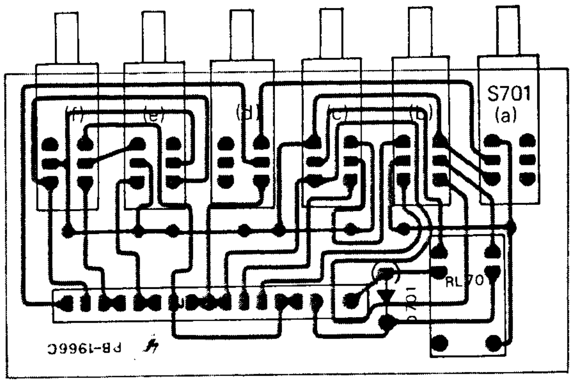




LED Connection

Viewed from component side

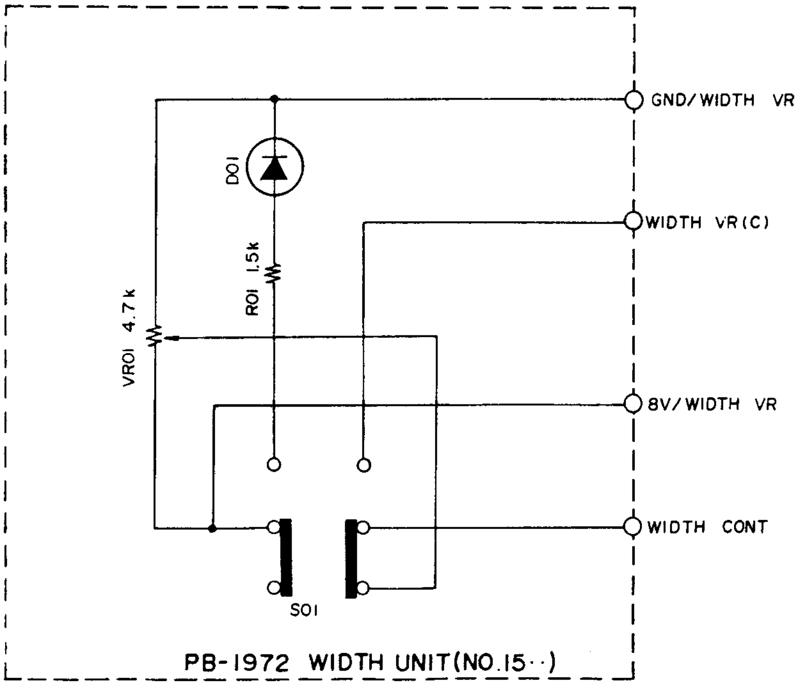


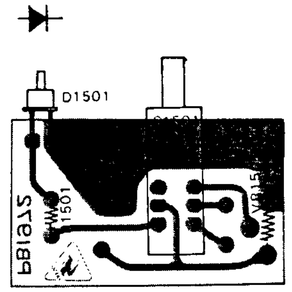




Viewed from solder side

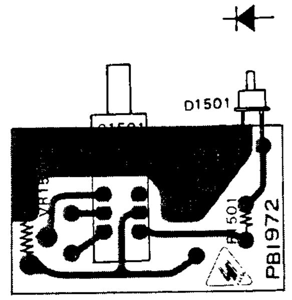
## BAND WIDTH CONTROL UNIT (PB-1972)

(Early model) Before Prod. #23

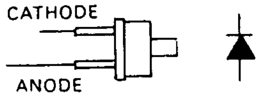



Viewed from component side



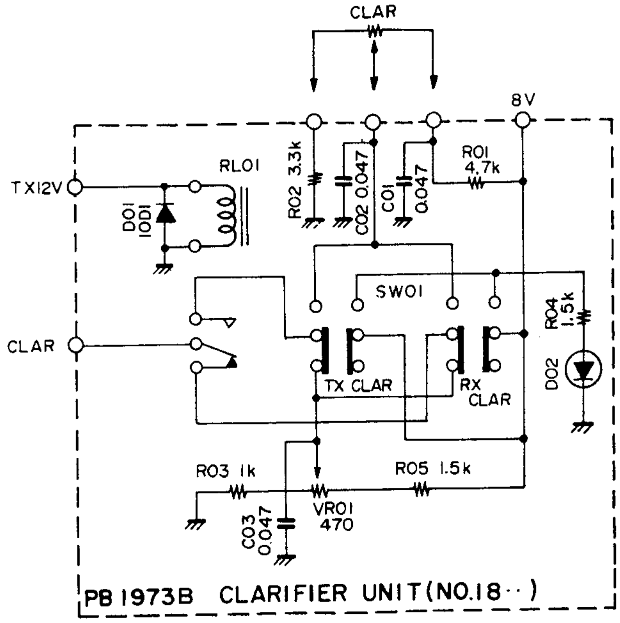

Viewed from solder side

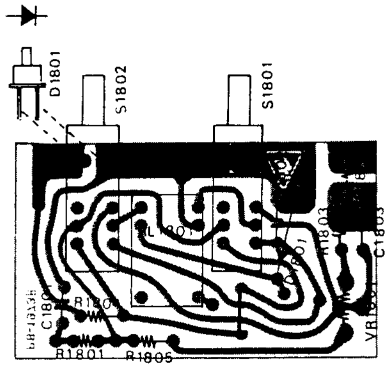



LED Connection

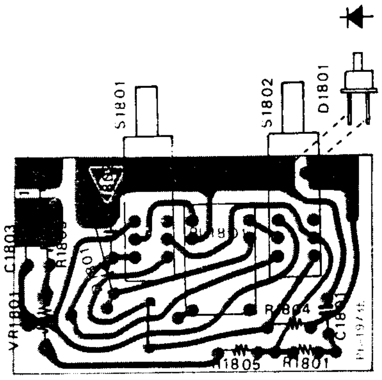
## CLARIFIER UNIT (PB-1973)





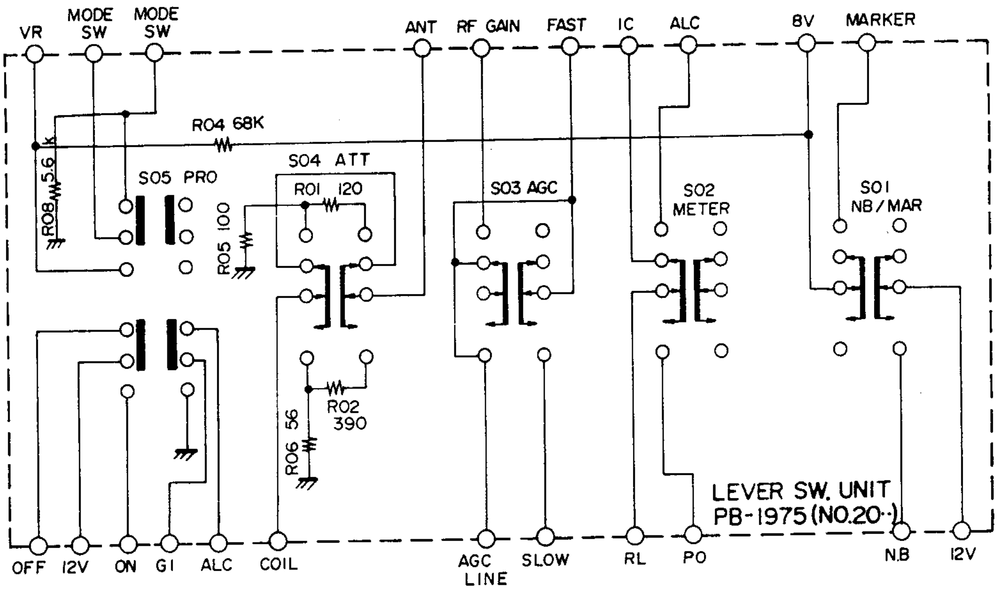



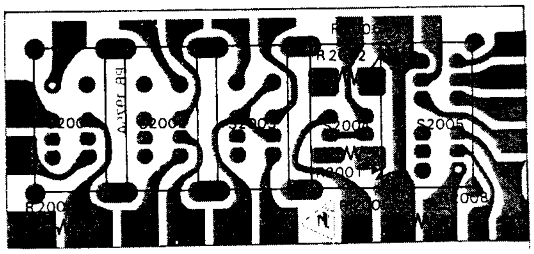

Viewed from component side



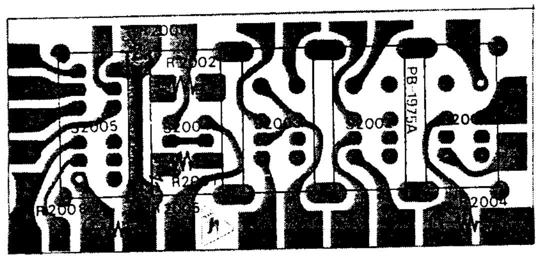

Viewed from solder side

# LEVER SWITCH UNIT (PB-1975A)

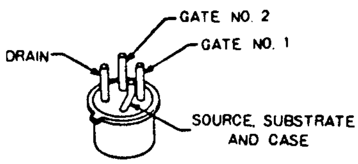


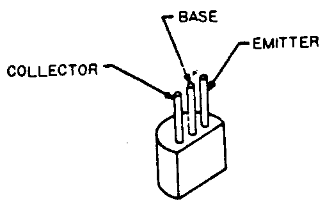
Viewed from component side



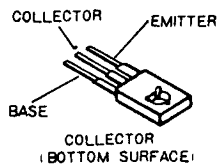
Viewed from solder side



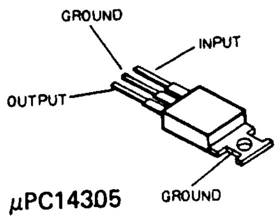

3SK40M
3SK51-03



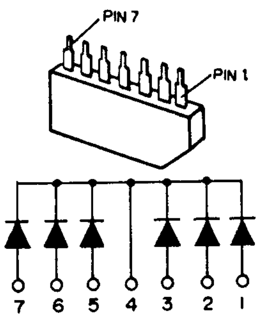

MPS3640



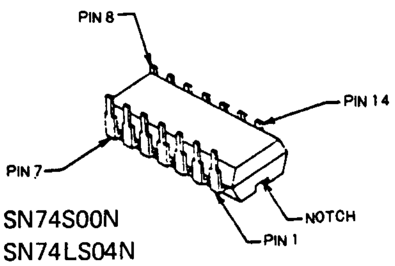

2SA496O



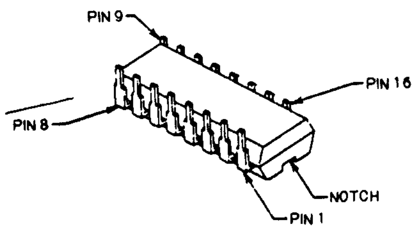

μPC14305



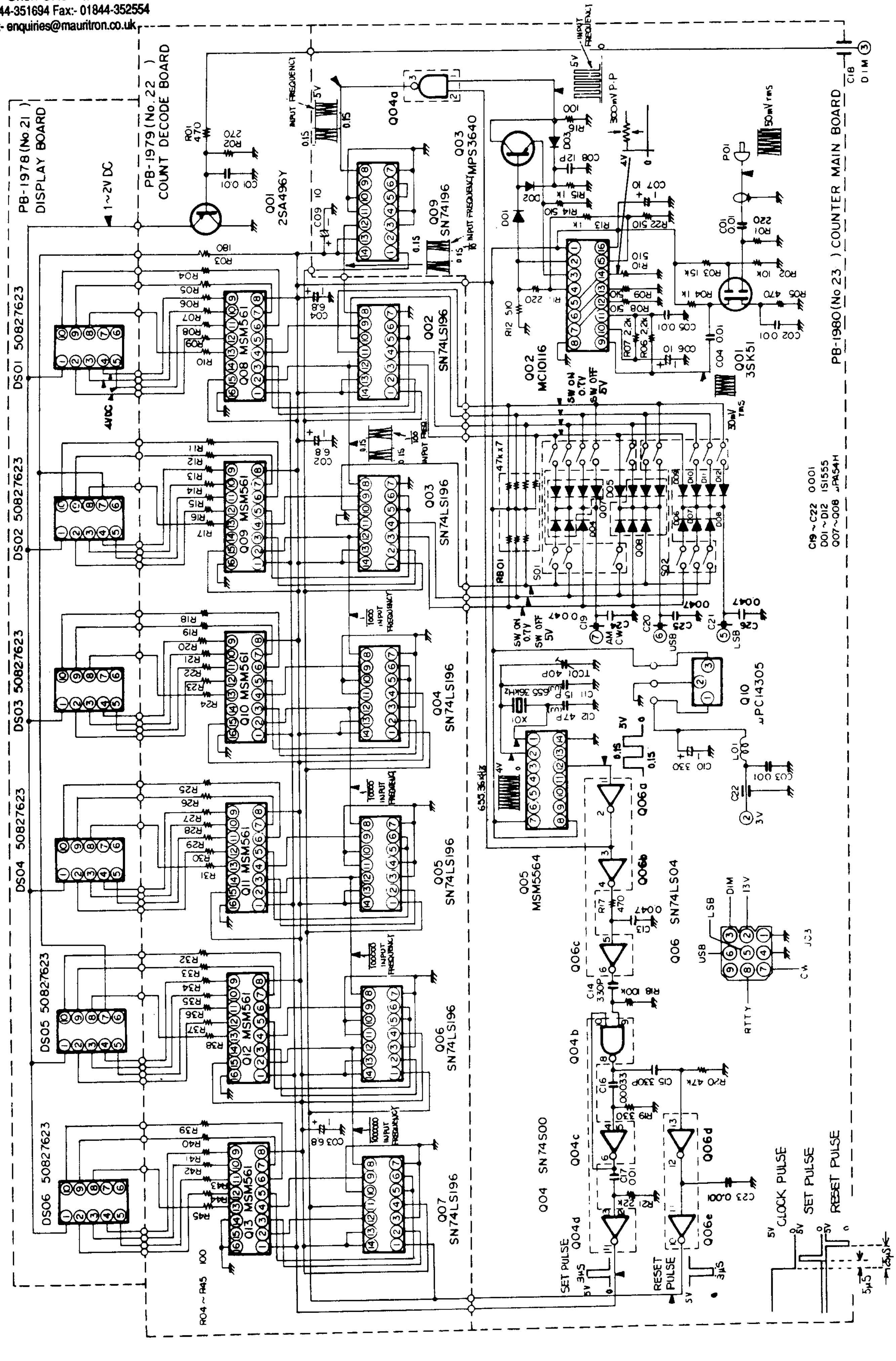

μPA54H




SN74S00N
SN74LS04N
SN74196N
SN74LS196N MSM5564

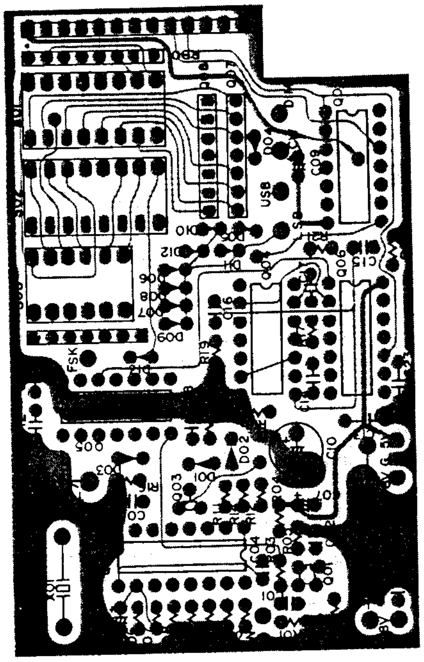



MSM561 MC10116

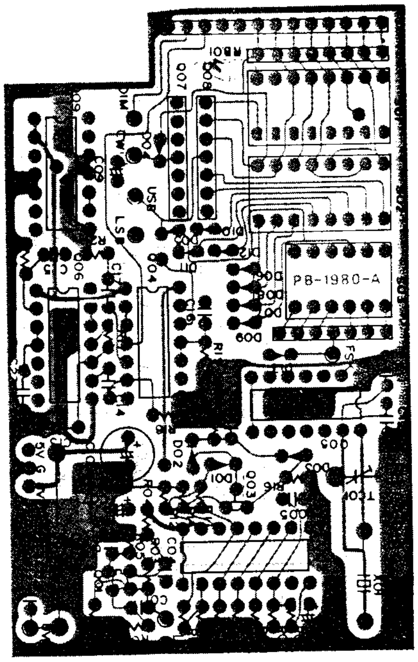

PB-1978 (No.21) DISPLAY BOARD
PB-1979 (No.22) COUNT DECODE BOARD
PB-1980 (No.23) COUNTER MAIN BOARD
Q01 2SA496Y
Q03 MPS3640
Q09 SN74196
Q02 SN74LS196
Q03 SN74LS196
Q04 SN74LS196
Q05 SN74LS196
Q06 SN74LS196
Q07 SN74LS196
Q08 MSM561
Q09 MSM561
Q10 MSM561
Q11 MSM561
Q12 MSM561
Q13 MSM561
DS01 50827623
DS02 50827623
DS03 50827623
DS04 50827623
DS05 50827623
DS06 50827623
R04 ~ R45 100
Q01 3SK51
Q02 MC10116
Q05 MSM5564
Q06 SN74LS04
Q04 SN74S00
Q10 μPC14305
C19 ~ C22 0.001
D01 ~ D12 1S1555
Q07 ~ Q08 μPA54H
CLOCK PULSE
SET PULSE
RESET PULSE

# COUNTER UNIT PARTS LAYOUT

(Early model) Before Prod. #15

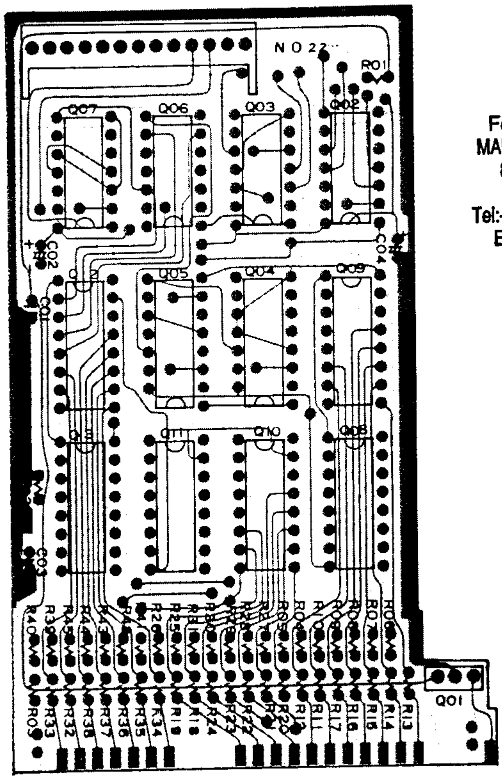


Viewed from component side



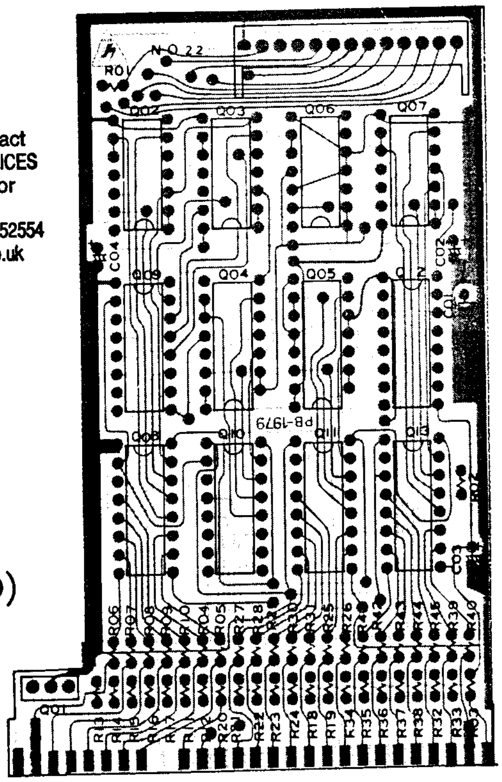
Viewed from solder side

(PB-1980)



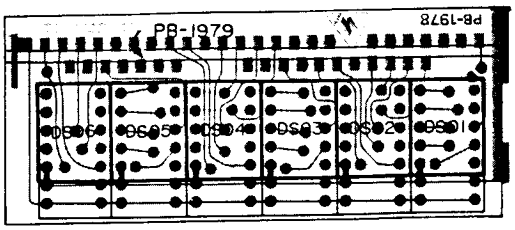
Viewed from component side



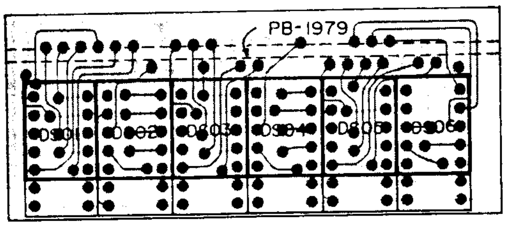


Viewed from solder side

(PB-1979)



Viewed from solder side



Viewed from component side

(PB-1978)

# REMOVAL OF COUNTER AND DISPLAY UNITS

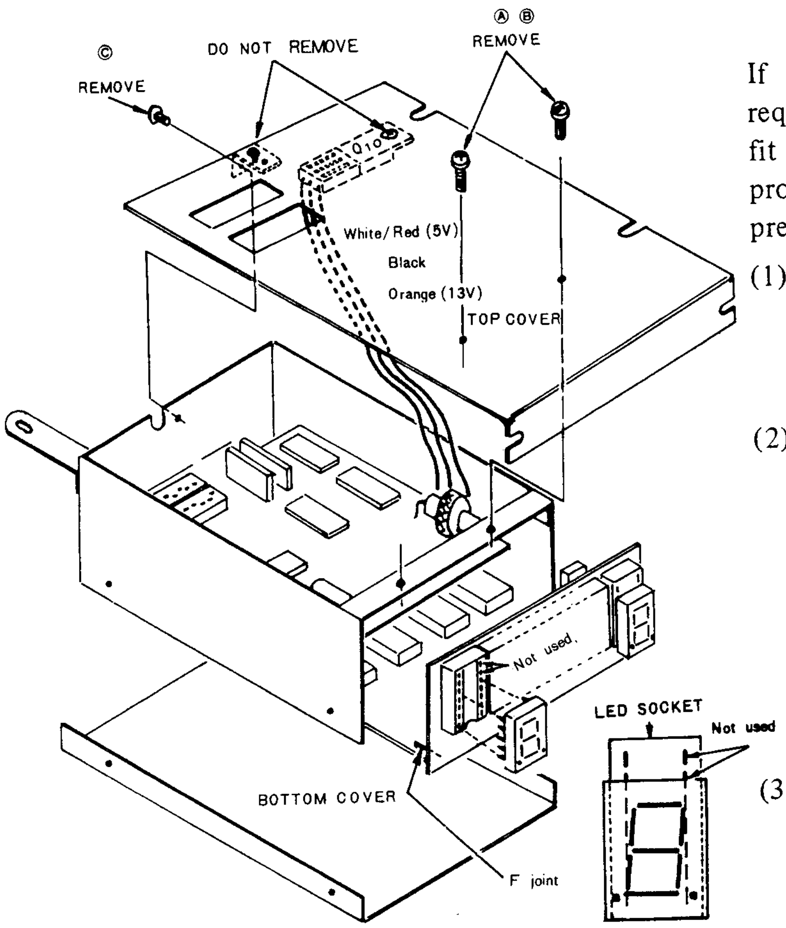



Figure 22.

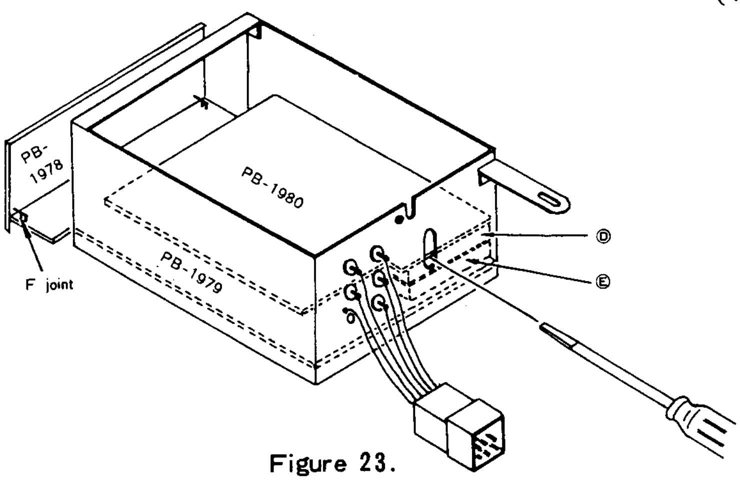



Figure 23.

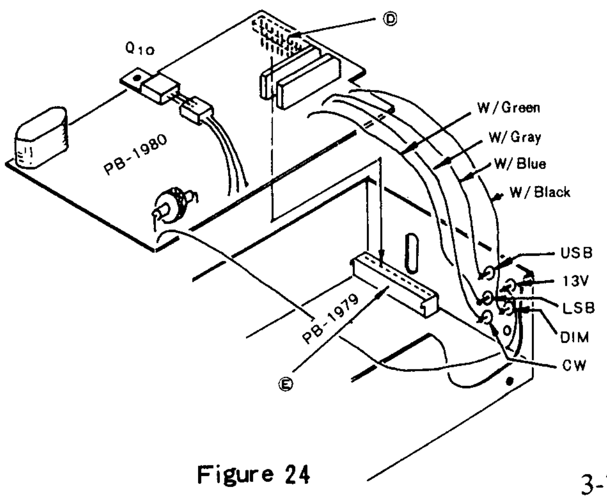



Figure 24

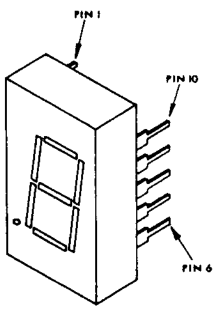
If servicing of the counter or display unit is required, some caution is required, as the physical fit of the two units is quite precise. However, the process is not difficult, if you follow the directions presented herein.

(1) Remove screws A, B, and C, as shown in Figure 22. Be careful not to remove the two screws on the top rear of the cover. Now remove the top cover.

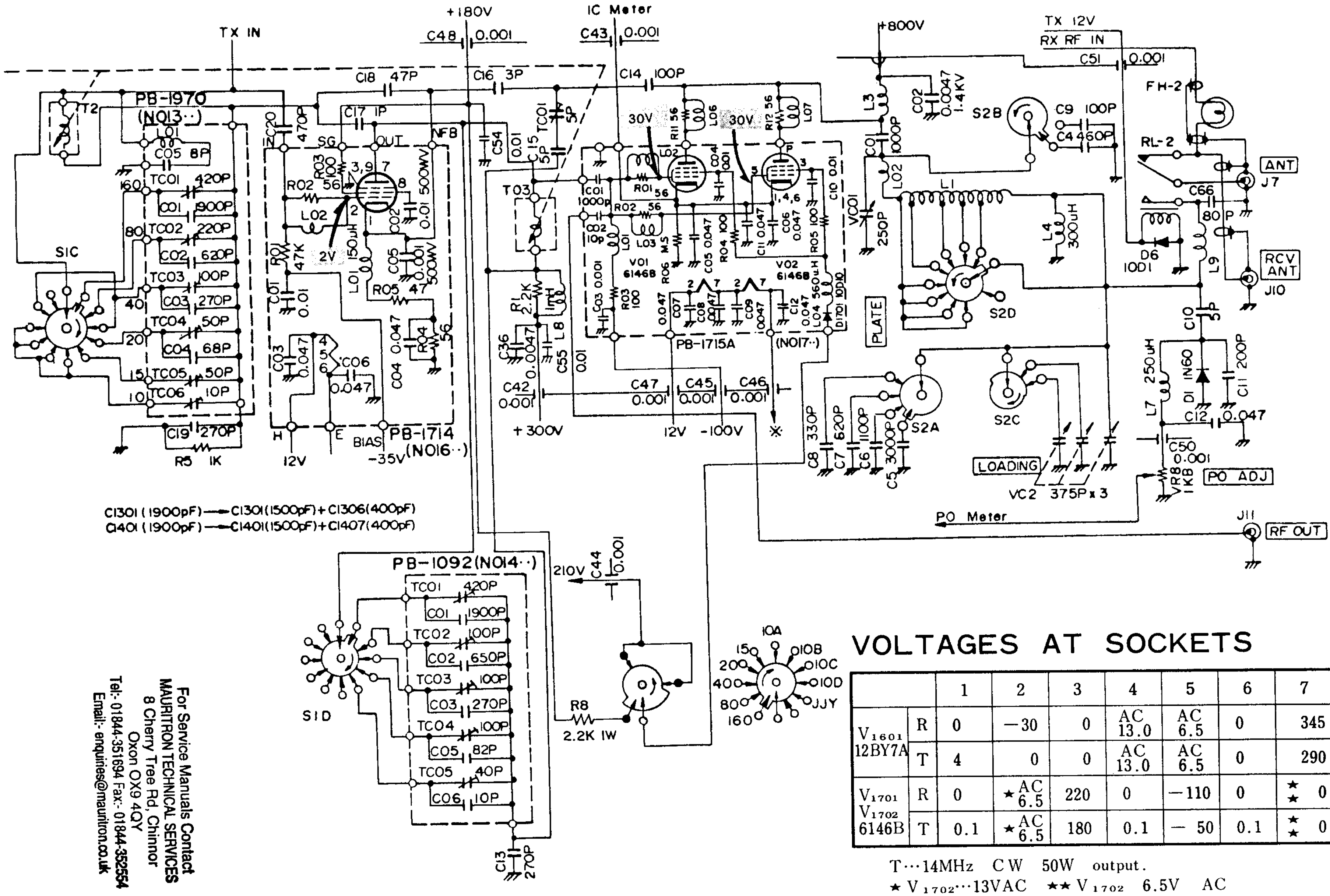
(2) PB-1980 and PB-1979 are stacked within the enclosure. The display module is held in place with two "F" joints, while the two circuit boards are held together by plug D and socket E. When replacing LED digits, note that the top two pins on each row of the socket are not used; be careful to align the LED correctly. The bottom cover is held in simply by a snap fit.

(3) To remove PB-1980, refer to Figure 23. and insert a small screwdriver in the oblong hole in the rear of the enclosure. Carefully pry plug D away from socket E, and then PB-1980 will be free for servicing.

(4) The color codes for the external access wiring are shown in Figure 24.




HP5082-7623




# VOLTAGES AT SOCKETS

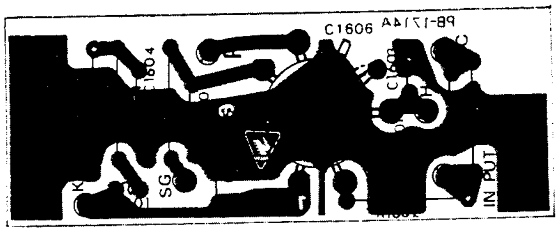
(V)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| $V_{1601}$ 12BY7A | R | 0 | −30 | 0 | AC 13.0 | AC 6.5 | 0 | 345 | 235 | 0 |
| | T | 4 | 0 | 0 | AC 13.0 | AC 6.5 | 0 | 290 | 190 | 0 |
| $V_{1701}$ $V_{1702}$ 6146B | R | 0 | ★ AC 6.5 | 220 | 0 | −110 | 0 | ★★ 0 | 900 | — |
| | T | 0.1 | ★ AC 6.5 | 180 | 0.1 | − 50 | 0.1 | ★★ 0 | 790 | — |

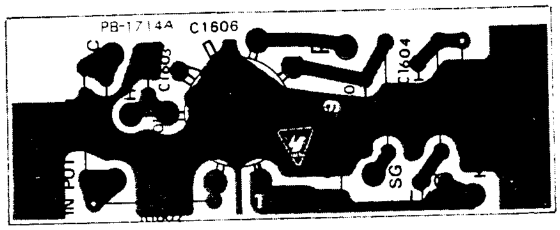
T···14MHz CW 50W output.

★ $V_{1702}$···13VAC ★★ $V_{1702}$ 6.5V AC

# DRIVER BOARD (PB-1714A)

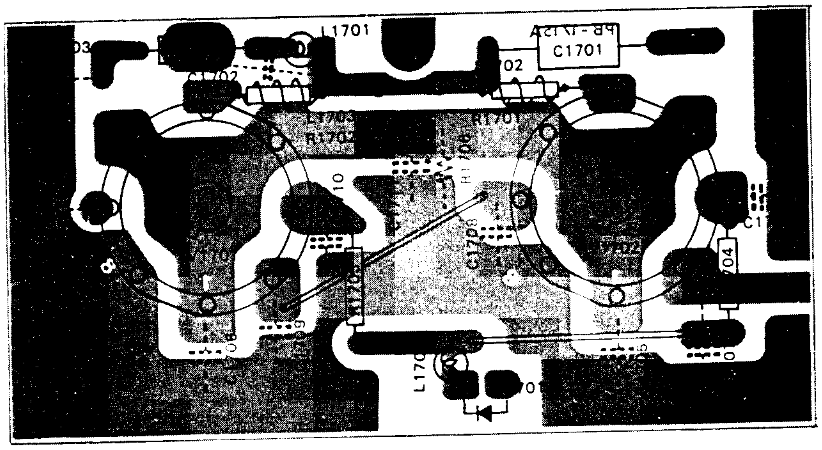



Viewed from component side

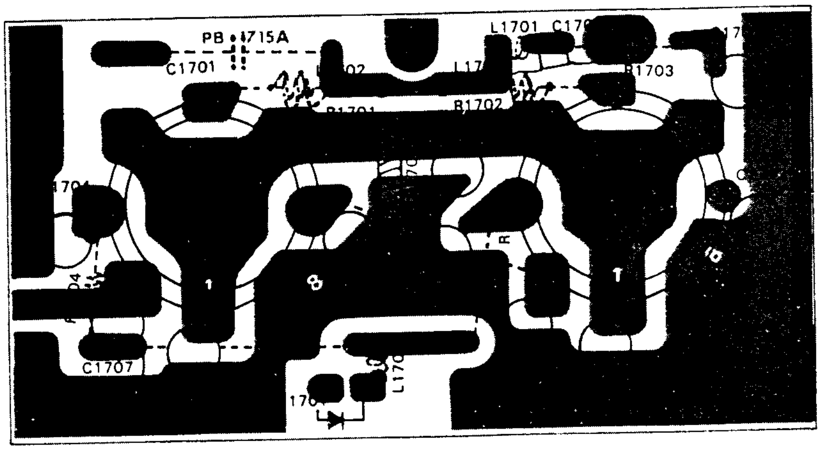



Viewed from solder side

# FINAL BOARD (PB-1715A)




Viewed from component side

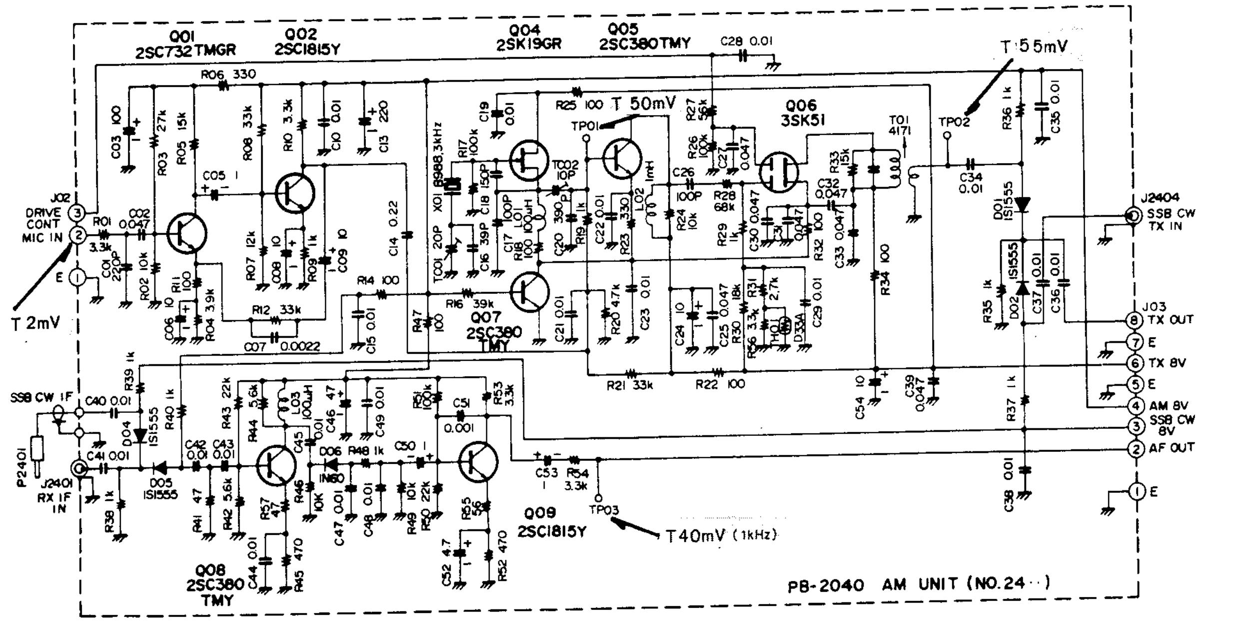


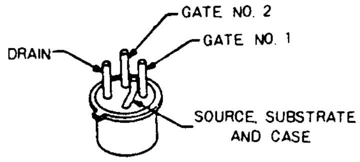



Viewed from solder side

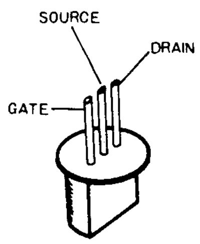
# AM UNIT (PB-2040)

(After Prod. #8)

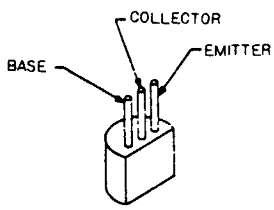



3SK40M
3SK51-03




2SK19GR




2SC380TM-Y
2SC732TM-GR
2SC1815Y

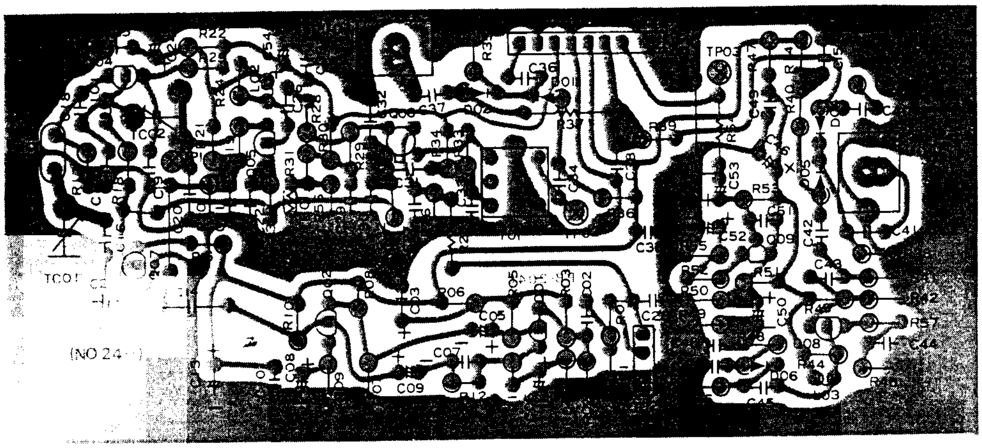
## DC VOLAGES

(V)

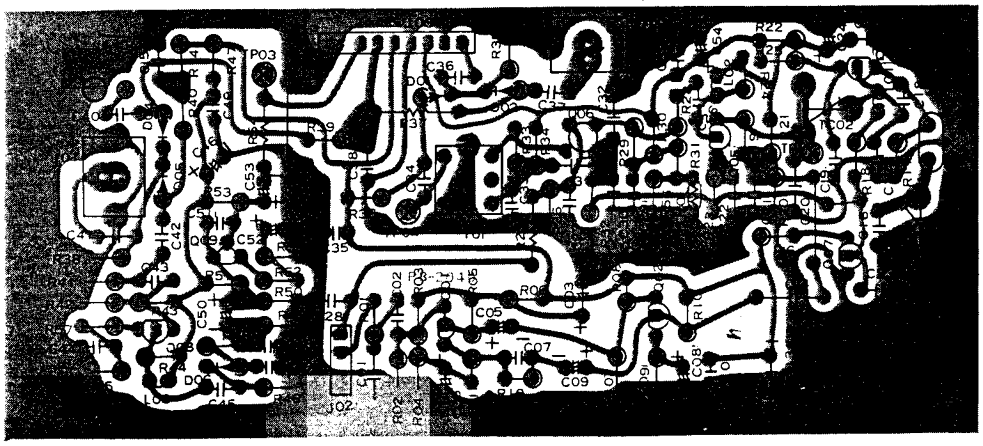
| | E(S) | | C(D) | | B($G_1$) | | ($G_2$) | | |
|---|---|---|---|---|---|---|---|---|---|
| | R | T | R | T | R | T | R | T | |
| $Q_{2401}$ | 1.4 | 1.4 | 2 | 2 | 2 | 2 | — | — | |
| $Q_{2402}$ | 1.3 | 1.3 | 3.5 | 3.5 | 2 | 2 | — | — | |
| $Q_{2404}$ | 0 | 0.6 | 0 | 7.5 | 0 | −2.5 | — | — | |
| $Q_{2405}$ | 0 | 0.3 | 0 | 8 | 0 | 1 | — | — | |
| $Q_{2406}$ | 0 | 1.3 | 0 | 6.5 | 0 | 3 | 0 | 1.5 | DRIVE MAX |
| $Q_{2407}$ | 0 | 0 | 0 | 0.15 | 0.6 | 0.8 | — | — | |
| $Q_{2408}$ | 0.8 | 0.8 | 7.5 | 7.5 | 0.5 | 0.5 | — | — | |
| $Q_{2409}$ | 0.6 | 0.6 | 3.9 | 3.9 | 1.2 | 1.2 | — | — | |

MODE AM

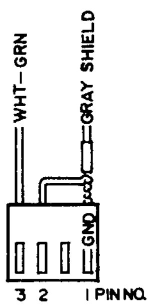
# AM UNIT PARTS LAYOUT



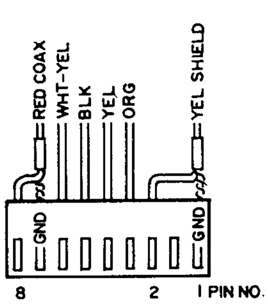
Viewed from component side



Viewed from solder side




P19(J2402)




P20(J2403)

# SECTION 4 – REPAIR PARTS

## PARTS LIST AND ORDERING FORMS

If you live in the United States, you may order parts from Yaesu Electronics Corporation. In other countries, you should order parts from the Yaesu agent for your country. In countries where Yaesu is not currently represented, you may order spare parts directly from Yaesu Musen Company, Ltd. in Tokyo.

When ordering, please specify the exact model number of the transceiver that the part is for. Many parts are standard, such as resistors and disc ceramic capacitors, but you should use particular care when ordering such items as electrolytics, tantalum capacitors, and the like.

The parts list to follow identifies the board that the parts belong to, as well as the circuit designation and part description. A "Part Number" is also specified, and this number will allow immediate identification by our parts department of the item you require. (**See note below.)

Shipment of parts from Yaesu USA is usually made by UPS, COD. Allow at least a week for the parts department to process your order. You will receive prompt notification that your order has been received, and if parts are back ordered, or if additional information is required, you will be so informed.

### PARTS ORDER EXAMPLE

| QUANTITY | TRANSCEIVER IDENTIFICATION | LOCATION | **PART NUMBER | CIRCUIT DESIGNATION |
|---|---|---|---|---|
| 1 | FT-101ZD | PB-1960A | G4800510C | $Q_{101}$ 3SK51-03 |

**Note: In earlier transceivers, no part numbering system was used in the manual. For this reason, the nomenclature "3SK51" will suffice for the part number. All FT-101ZD transceivers have a part number for each component.

(cut here)

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – 6851 Walthall Way, Paramount, CA90732
YAESU ELECTRONICS CORPORATION – 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

### ORDER BLANK

| QUANTITY | TRANSCEIVER IDENTIFICATION | LOCATION | PART NUMBER | CIRCUIT DESIGNATION |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

I authorize shipment via: ☐ Best Way ☐ Parcel Post ☐ UPS ☐ Other

Ship To: (Print or Type)
Name: ______
Address: ______
City: ______ State: ______ Zip: ______
Country: ______

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – P.O. Box 498, Paramount, CA 90723
YAESU ELECTRONICS CORPORATION – 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

## ORDER BLANK

| QUANTITY | TRANSCEIVER IDENTIFICATION | LOCATION | PART NUMBER | CIRCUIT DESIGNATION |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

I authorize shipment via: ☐ Best Way ☐ Parcel Post ☐ UPS ☐ Other

Ship To: (Print or Type)
Name: ______
Address: ______
City: ______ State: ______ Zip: ______
Country: ______

(cut here)

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN
YAESU ELECTRONICS CORPORATION – P.O. Box 498, Paramount, CA 90723
YAESU ELECTRONICS CORPORATION – 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

## ORDER BLANK

| QUANTITY | TRANSCEIVER IDENTIFICATION | LOCATION | PART NUMBER | CIRCUIT DESIGNATION |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

I authorize shipment via: ☐ Best Way ☐ Parcel Post ☐ UPS ☐ Other

Ship To: (Print or Type)
Name: ______
Address: ______
City: ______ State: ______ Zip: ______
Country: ______

# PARTS LIST

## MAIN CHASSIS

| Symbol No. | Parts No. | Description |
|---|---|---|
| | | **IC, TRANSISTOR** |
| Q2 | G31049600 | TR 2SA496(O) |
| Q1 | G3206160 | " 2SB616 |
| Q4 | G34023500 | " 2SD235(O) |
| Q3 | G1090070 | IC μPC14308 |
| Q5 | G1090080 | " μPC78L08 |
| | | |
| | | |
| | | **DIODE** |
| D1 | G2090029 | Ge 1N60 |
| D2–5 | G2015550 | Si 1S1555 |
| D6 | G2090001 | " 10D1 |
| | | |
| | | |
| | | |
| | | **RESISTOR** |
| R22, 24 | J01245220 | Carbon film 1/4W TJ 22 Ω |
| R23 | J00245330 | " " " VJ 33 Ω |
| R14 | J01245560 | " " " TJ 56 Ω |
| R7, 11 | J01245101 | " " " " 100 Ω |
| R18 | J01245821 | " " " " 820 Ω |
| R4, 5 | J01245102 | " " " " 1 kΩ |
| R6 | J01245152 | " " " " 1.5 kΩ |
| R19 | J01245182 | " " " " 1.8 kΩ |
| R17 | J01245222 | " " " " 2.2 kΩ |
| R20 | J01245474 | " " " " 470 kΩ |
| R2 | J10276100 | Carbon composition 1/2W GK 10 Ω |
| R9, 10 (with L5, L6) | – | " " " " 56 Ω |
| R3 | J10276101 | " " " " 100 Ω |
| R1 | J10276222 | " " " " 2.2 kΩ |
| | | |
| | | |
| | | |
| | | **POTENTIOMETER** |
| VR1 | J60800035 | VM11AB06A5M1112 10 kΩB |
| VR2 | J62800032 | DM10A039A 500 kΩB/20 kΩB |
| VR3 | J62800033 | DM10A039A 5 kΩA/5 kΩB |
| VR4 | J60800043 | VM10A592A 5 kΩA |
| VR5, 6 | J60800036 | VM10A592A 5 kΩB |
| VR7 | J62800034 | DM10A39A 5 kΩB/5 kΩA |
| VR8 | J60800037 | VM10A654A 1 kΩB |
| VR9, 10 | J60800038 | VM10A654A 5 kΩB |
| VR11 | J60800039 | VM10AB08A 5 kΩB |
| | | |
| | | |
| | | |
| | | **CAPACITOR** |
| | | Dipped mica 500 WV 5 pF |
| C13, 19, 21 | K30276271 | " " " 270 pF (LCQ1727271K5) |
| C8 | K30276331 | " " 500 WV 330 pF (DM-15-331K5) |
| C7 | K30276621 | " " 500 WV 620 pF (DM19D621K5) |
| C6 | K30279052 | " " 500 WV 1100 pF (DM19-112K5) |
| | | |

| Symbol No. | Parts No. | Description |
|---|---|---|
| C5 | K30279062 | Dipped mica 500 WV 3000 pF (DM19-302K5) |
| C66 | K31306800 | Moulded mica 1 KWV 80 pF |
| C17 | K02279001 | Ceramic 500 WV 1 pF |
| C10 | K02279002 | " " 5 pF |
| C18 | K02279003 | " " 47 pF |
| C11 | K00279001 | " " 200 pF |
| C20 | K00279002 | " " 470 pF |
| C16 | K00309001 | " 1 KV 3 pF |
| C15 | K02309002 | " " 5 pF |
| C14 | K02309003 | " " 100 pF |
| C3 | K00329002 | " 1.5 KWV 460 pF |
| C9 | K00359001 | " 3 KV 100 pF |
| C1 | K12359001 | " " 1000 pF |
| C29, 34, 35, 41, 64 | K13170103 | " 50 WV 0.01 μF |
| C12, 22–24, 39, 40, 56, 58, 60, 68, 69 | K13170473 | " " 0.047 μF |
| C27, 28, 36 | K12279004 | " 500 WV 0.0047 μF |
| C30,32,33,54, 55, 61 | K12279002 | " " 0.01 μF |
| C2, 25, 26 | K12329002 | " 1.4 KV 0.0047 μF |
| C31, 37 | K12329001 | " " 0.01 μF |
| C42–51 | K21270002 | Feed thru 500 WV 0.001 μF (ECK-L2H102PE) |
| C63 | K40120476 | Electrolytic 16 WV 47 μF |
| C65 | K40120337 | " " 330 μF |
| C70 | K40120106 | " " 10 μF |
| C67 | K40100336 | " 10 WV 33 μF |
| C71 | K50177104 | Mylar 50 WV 0.1 μF |
| | | |
| | | |
| | | **VARIABLE CAPACITOR** |
| VC1 | K90000026 | YB-250 250 pF |
| VC2 | K90000016 | C134E125 |
| | | |
| | | |
| | | **TRIMMER CAPACITOR** |
| TC1 | K91000007 | TSN120C 10P x 2 |
| | | |
| | | |
| | | |
| | | **INDUCTOR** |
| L1 | L0020534B | #220534B |
| L2 | L0020611 | #220611 |
| L3 | L1020065 | #220065 |
| L4 | L1020064 | #220064 |
| L5, L6 (R9, R10) | L1020308 | #220308 |
| L7 | L1190001 | EL0710-251K 250 μH |
| L8 | L1190017 | FL-5H-102J 1 mH |
| L9 | L0020705 | #220674 |
| | | |
| | | |
| | | |
| | | |

| | | |
|---|---|---|
| | | **TRANSFORMER** |
| T1 | L0020544 | #220544 |
| T2 | L0020011 | #220011 |
| T3 | L0020074 | #220074 |
| | | **METER** |
| M1 | M0090002 | Y-45-02 #250042 |
| | | **SPEAKER** |
| SP1 | M4090005 | SA-92Y 4 Ω 3 W |
| | | **POWER TRANSFORMER** |
| PT1 | L3030028 | 52-74 (#230028) |
| | | **RELAY** |
| RL1 | M1190004 | FRL-263 D012/04CS01 |
| RL2 | M1090002 | MX2P |
| | | **RELAY SOCKET** |
| RLS1 | M1490010 | 263H204 |
| RLS2 | M1490001 | PX08 |
| | | **SWITCH** |
| S1 | N0050041· | #250041 (SRS) |
| S2 | N0050007 | #250044 (RS2-4-11) |
| S3 *(Lot 1–7) | N0190025 | ESR-E485R20 |
| S3 *(Lot 8→) | N0190037 | ESR-E486R20 |
| S4, 5 | N7090005 | WD9223 |
| | | **COOLING FAN** |
| FAN1 | M2090001 | 2SB10A |
| | | **RECEPTACLE** |
| J1, 3 | P1090004 | SG7814 |
| J2 | P0090011 | FM144S |
| J4 | P1090033 | D6-701B00 |
| J5 (with wire) | P1090062 | 1625-09R-1 (#240128A) |
| J6 | P1090014 | SI7501-1 |
| J7 | P1090028 | M-BR-06B |
| J8 | P1090040 | SA607B00 |
| J9–14, 18 | P1090025 | STR-01 |
| J15 | P1090005 | SG-8050 |
| J16 | P1090045 | AC9-PF |
| J17 | P0090047 | QS-DB6-ML |
| J19 | P1090111 | J-7015 |

| | | |
|---|---|---|
| | | **MULTI JACK** |
| MJ1 | P4090001 | 121S-10B-105A |
| MJ2 | P4090007 | 220D-20B-205A |
| MJ3 | P4090002 | 121S-14B-105A |
| | | **PLUG** |
| P1 (with wire) | P1090079; | 5047-12A (#240129B) |
| P2 ( ″ ) | P1090080; | 5047-13A (#240130B) |
| P3 ( ″ ) | P1090082; | 5047-15A (#240131B) |
| P4 ( ″ ) | P1090086 | 5047-19A (#240132) |
| P5 ( ″ ) | P1090082 | 5047-15A (#240133) |
| P6 ( ″ ) | P1090075 | 5047-08A (#240134) |
| P7 ( ″ ) | P1090072 | 5047-05A (#240135) |
| P8 ( ″ ) | P1090082 | 5047-08A } |
| P9 ( ″ ) | P1090079 | 5047-12A } (#240137) |
| P10 ( ″ ) | P1090083 | 5047-16A } |
| P18 ( ″ ) | P1090070 | 5047-03A (#240129) |
| P11, 14, 22 | P0090045 | SQ4052 |
| P15 | P0090002 | SI5908 |
| P16 | P0090005 | SI-7502 |
| P19 | P1090070 | 5047-03A |
| P20 | P1090075 | 5047-08A |
| P21 | P0090075 | P-7015 |
| | | **FUSE** |
| F1 | Q0000005 | 5 A (100V–117V) |
| | Q0000004 | 3 A (200V–234V) |
| | | **FUSE HOLDER** |
| FH1 | P2000001 | SN1001 #2 |
| FH2 | P2000003 | F3265 |
| | | **PILOT LAMP** |
| PL1 | Q1000026 | BF311-04071A |
| PL2–5 | Q1000033 | K0252-6-8 |
| | Q5000010 | Thru terminal FT-SM1 |
| | Q4000002 | ″ A339 (HV) |
| | Q6000042 | Terminal block ML-3182 20P |
| | Q6000004 | Terminal board 1L2PS (2-0) |
| | Q6000007 | ″ 1L3PS (2-0-1) |
| | Q6000011 | ″ 1L4PS (2-0-2) |
| | Q6000003 | ″ 1L2PS (1-0-1) |
| | Q6000008 | ″ 1L3PS (3-0) |

| | | |
|---|---|---|
| | | ★★★★★ LED B BOARD ★★★★★ |
| PB-1390 | F0001390 | P.C. Board |
| D9 | G2090060 | GD4-203-SRD |

## RF UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019600 | RF unit with components |
| PB-1960A | F0001960A | P.C. Board |
| | | **FET & TRANSISTOR** |
| Q103, 104 | G3800190G | FET 2SK19GR |
| Q105, 106 | G4800400M | 〃 3SK40M |
| Q101 | G4800510C | 〃 3SK51-03 |
| Q102 | G3090019 | 〃 J310 |
| Q107 | G3090010 | TR 2N4427 |
| | | **DIODE** |
| D104 | G2010070 | Ge (GB) 1S1007 |
| D101–103 | G2015550 | Si 1S1555 |
| | | **RESISTOR** |
| R119 | J00245479 | Carbon film 1/4W VJ 4.7 Ω |
| R126, 127 | J00245100 | 〃 〃 〃 〃 10 Ω |
| R110 | J00245820 | 〃 〃 〃 〃 82 Ω |
| R106–108, 116, 120, 121, 130 | J00245101 | 〃 〃 〃 〃 100 Ω |
| | J00245221 | 〃 〃 〃 〃 220 Ω |
| R111,113,114, 128,129 | J00245331 | 〃 〃 〃 〃 330 Ω |
| R112 | J00245471 | 〃 〃 〃 〃 470 Ω |
| R118 | J00245821 | 〃 〃 〃 〃 820 Ω |
| R105 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R117 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R102, 122 | J00245272 | 〃 〃 〃 〃 2.7 kΩ |
| R104, 109 | J00245562 | 〃 〃 〃 〃 5.6 kΩ |
| R115 | J00245822 | 〃 〃 〃 〃 8.2 kΩ |
| R124 | J00245223 | 〃 〃 〃 〃 22 kΩ |
| R103 | J00245393 | 〃 〃 〃 〃 39 kΩ |
| R123 | J00245563 | 〃 〃 〃 〃 56 kΩ |
| R125 | J00245124 | 〃 〃 〃 〃 120 kΩ |
| R101 | J10246225 | Carbon composition 1/2W GK 2.2 MΩ |
| | | **CAPACITOR** |
| C125 | K30173030 | Dipped mica 50 WV 3 pF |
| C107 | K30173040 | 〃 〃 〃 4 pF |
| C116 | K30176471 | 〃 〃 〃 470 pF |
| C126 | K02179009 | Ceramic 〃 CH 22 pF |
| C102, 108 | K00175101 | Ceramic 50WV SL 100 pF |
| C103–106, 110–112, 114,115,117, 119–124 | K13170103 | 〃 〃 0.01 µF |
| C101, 118 | K13170473 | 〃 〃 0.047 µF |
| C113 | K40120106 | Electrolytic 16WV TT 10 µF |
| | | **TRIMMER CAPACITOR** |
| TC101 | K91000019 | ECV-1ZW 10 x 40 10 pF |
| | | **INDUCTOR** |
| L101, 102 | L1190038 | FL-5H271K 270 µH |
| | | **TRANSFORMER** |
| T101,103,105 | L0020209 | #220209 |
| T102, 104 | L0020221 | #220221 |
| | | **JACK** |
| J101–103 | P1090018 | SQ3081 |



## NB-FIX UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019610 | NB-FIX unit with components |
| PB-1961B | F0001961B | P.C. Board |
| | | **TRANSISTOR** |
| Q201–204 | G3303720Y | 2SC372Y |
| Q205, 206 | G3315830 | 2SC1583 |
| | | **DIODE** |
| D201–204 | G2090029 | Ge 1N60 |
| D205–209 | G2015550 | Si 1S1555 |
| | | **RESISTOR** |
| R208,216,224, 230,238,239, | J00245101 | Carbon film 1/4W VJ 100 Ω |
| R204 | J00245221 | 〃 〃 〃 〃 220 Ω |
| R222, 236 | J00245471 | 〃 〃 〃 〃 470 Ω |
| R231–233,235 | J00245561 | 〃 〃 〃 〃 560 Ω |
| R206,215,221, 234,237 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R207 | J00245222 | 〃 〃 〃 〃 2.2 kΩ |

**★★★★★ LED B BOARD ★★★★★**

| | | |
|---|---|---|
| PB-1390 | F0001390 | P.C. Board |
| D9 | G2090060 | GD4-203-SRD |

## RF UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019600 | RF unit with components |
| PB-1960A | F0001960A | P.C. Board |
| | | **FET & TRANSISTOR** |
| Q103, 104 | G3800190G | FET 2SK19GR |
| Q105, 106 | G4800400M | 〃 3SK40M |
| Q101 | G4800510C | 〃 3SK51-03 |
| Q102 | G3090019 | 〃 J310 |
| Q107 | G3090010 | TR 2N4427 |
| | | **DIODE** |
| D104 | G2010070 | Ge (GB) 1S1007 |
| D101−103 | G2015550 | Si 1S1555 |
| | | **RESISTOR** |
| R119 | J00245479 | Carbon film 1/4W VJ 4.7 Ω |
| R126, 127 | J00245100 | 〃 〃 〃 〃 10 Ω |
| R110 | J00245820 | 〃 〃 〃 〃 82 Ω |
| R106−108, 116, 120, 121 130 | J00245101 | 〃 〃 〃 〃 100 Ω |
| | J00245221 | 〃 〃 〃 〃 220 Ω |
| R111,113,114, 128,129 | J00245331 | 〃 〃 〃 〃 330 Ω |
| R112 | J00245471 | 〃 〃 〃 〃 470 Ω |
| R118 | J00245821 | 〃 〃 〃 〃 820 Ω |
| R105 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R117 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R102, 122 | J00245272 | 〃 〃 〃 〃 2.7 kΩ |
| R104, 109 | J00245562 | 〃 〃 〃 〃 5.6 kΩ |
| R115 | J00245822 | 〃 〃 〃 〃 8.2 kΩ |
| R124 | J00245223 | 〃 〃 〃 〃 22 kΩ |
| R103 | J00245393 | 〃 〃 〃 〃 39 kΩ |
| R123 | J00245563 | 〃 〃 〃 〃 56 kΩ |
| R125 | J00245124 | 〃 〃 〃 〃 120 kΩ |
| R101 | J10246225 | Carbon composition 1/2W GK 2.2 MΩ |
| | | **CAPACITOR** |
| C125 | K30173030 | Dipped mica 50 WV 3 pF |
| C107 | K30173040 | 〃 〃 〃 4 pF |
| C116 | K30176471 | 〃 〃 〃 470 pF |
| C126 | K02179009 | Ceramic 〃 CH 22 pF |
| C102, 108 | K00175101 | Ceramic 50WV SL 100 pF |
| C103−106, 110−112, 114,115,117, 119−124 | K13170103 | 〃 〃 0.01 μF |
| C101, 118 | K13170473 | 〃 〃 0.047 μF |
| C113 | K40120106 | Electrolytic 16WV TT 10 μF |
| | | **TRIMMER CAPACITOR** |
| TC101 | K91000019 | ECV-1ZW 10 x 40 10 pF |
| | | **INDUCTOR** |
| L101, 102 | L1190038 | FL-5H271K 270 μH |
| | | **TRANSFORMER** |
| T101,103,105 | L0020209 | #220209 |
| T102, 104 | L0020221 | #220221 |
| | | **JACK** |
| J101−103 | P1090018 | SQ3081 |

## NB·FIX UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019610 | NB-FIX unit with components |
| PB-1961B | F0001961B | P.C. Board |
| | | **TRANSISTOR** |
| Q201−204 | G3303720Y | 2SC372Y |
| Q205, 206 | G3315830 | 2SC1583 |
| | | **DIODE** |
| D201−204 | G2090029 | Ge 1N60 |
| D205−209 | G2015550 | Si 1S1555 |
| | | **RESISTOR** |
| R208,216,224, 230,238,239, | J00245101 | Carbon film 1/4W VJ 100 Ω |
| R204 | J00245221 | 〃 〃 〃 〃 220 Ω |
| R222, 236 | J00245471 | 〃 〃 〃 〃 470 Ω |
| R231−233,235 | J00245561 | 〃 〃 〃 〃 560 Ω |
| R206,215,221, 234,237 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R207 | J00245222 | 〃 〃 〃 〃 2.2 kΩ |

| | | |
|---|---|---|
| T309, 310 | L0020505 | #220505 |
| T311, 312 | L0020633 | #220633 |
| T313, 314 | L0020507 | #220507 |
| T315 | L0020210 | #220210 |
| | | **JACK** |
| J301 | P1090018 | SQ3081 |
| P301 | P0090045 | SQ4052 |

## IF UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019630 | IF unit with components |
| PB-1963C | F0001963C | P.C. Board |
| | | **IC, FET, TRANSISTOR** |
| Q403 | G1090063 | IC TA7060P |
| Q406 | G3800190B | FET 2SK19BL |
| Q402,413,414, 419, 425 | G3800190G | 〃 2SK19GR |
| Q401,405,412, 415, 416 | G4800510C | 〃 3SK51-03 |
| Q408 | G3090019 | 〃 J310 |
| Q407, 420 | G3105641 | TR 2SA564A |
| Q404,409,410, 417, 418, 422–424 | G3303720Y | 〃 2SC372Y |
| Q421 | G3305350A | 〃 2SC535A |
| Q411 | G3090005 | 〃 MPSA13 |
| | | **DIODE** |
| D416, 417 | G2090029 | Ge 1N60 |
| D405–408, 414, 421 | G2010070 | 〃 (GB) 1S1007 |
| D401–404, 409–413, 419 | G2015550 | Si 1S1555 |
| D418 | G2022090 | Varactor 1S2209 |
| D422 | G2090040 | 〃 FC63 |
| D420, 423 | G2090010 | Zener WZ090 |
| | | **CRYSTAL** |
| X401 | H0100431 | HC-18/U 19.7475 MHz |
| | | **CRYSTAL FILTER** |
| XF401 | H1100860 | XF8.9HS |
| XF402(Option) | H1100880 | XF8.9HC |
| XF403 | H1100890 | XF8.9HP |
| XF404 | H1100470 | 8.9M20A |
| XF405 | H1100900 | XF10GS |
| | | **RESISTOR** |
| R0517, 0518, 0520 | J00245220 | Carbon film 1/4W VJ 22 Ω |
| R410, 411 | J01245101 | 〃 〃 〃 TJ 100 Ω |
| R402,408,422, 423,437,439, 444,446,463, 464,469,475, 482,483,497 | J00245101 | 〃 〃 〃 VJ 100 Ω |
| R419,425,447, 451,486, 0507,0508 | J00245221 | 〃 〃 〃 〃 220 Ω |
| R0502 | J00245331 | 〃 〃 〃 〃 330 Ω |
| | J00245391 | 390 Ω |
| R443 | J00245471 | 〃 〃 〃 〃 470 Ω |
| R430,474,480 | J00245561 | 〃 〃 〃 〃 560 Ω |
| R467, 468 | J00245681 | 〃 〃 〃 〃 680 Ω |
| R0515 | J00245821 | 〃 〃 〃 〃 820 Ω |
| R406,416,428, 437,440,442, 449,453,457, 459,462,488, 494,0504, 0506 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R429, 495 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R0516 | J01245152 | 〃 〃 〃 TJ 1.5 kΩ |
| R454,455,458, 0510 | J00245222 | 〃 〃 〃 VJ 2.2 kΩ |
| R460 | J00245272 | 〃 〃 〃 〃 2.7 kΩ |
| R401,409,412, 413,417,431, 456,496,0511 | J00245332 | 〃 〃 〃 〃 3.3 kΩ |
| R426, 427 | J00245472 | 〃 〃 〃 〃 4.7 kΩ |
| R403,445,481, 489 | J00245562 | 〃 〃 〃 〃 5.6 kΩ |
| R434, 450 | J00245682 | 〃 〃 〃 〃 6.8 kΩ |
| R404,407,420, 421,424,436, 471,477,484, 485,491,492, 0501, 0509, 0512 | J00245103 | 〃 〃 〃 〃 10 kΩ |
| R433 | J01245103 | 〃 〃 〃 TJ 10 kΩ |
| R470, 476 | J00245123 | 〃 〃 〃 VJ 12 kΩ |
| R415,438,498, 499 | J00245153 | 〃 〃 〃 〃 15 kΩ |
| R414 | J00245273 | 〃 〃 〃 〃 27 kΩ |
| R461,472,478, 0500 | J00245473 | 〃 〃 〃 〃 47 kΩ |
| R405,465,466 | J00245104 | 〃 〃 〃 〃 100 kΩ |
| R493 | J00245154 | 〃 〃 〃 〃 150 kΩ |
| R448,452,487, 0503, 0505 | J00245184 | 〃 〃 〃 〃 180 kΩ |
| R441 | J00245334 | 〃 〃 〃 〃 330 kΩ |

| | | |
|---|---|---|
| R0521 | J01245474 | Carbon film 1/4W TJ 470 kΩ |
| R432 | J00245684 | " " " VJ 680 kΩ |
| R490 | J00245105 | " " " " 1 MΩ |
| | J00245225 | " " " " 2.2 MΩ |
| R0519 | J10246565 | " composition " GK 5.6 MΩ |
| | | **POTENTIOMETER** |
| VR401, 402 | J51723102 | SR-19R 1 kΩB |
| VR403, 404 | J51723103 | 10 kΩB |
| VR405 | J51723473 | 47 kΩB |
| | | **CAPACITOR** |
| C477 | K30176221 | Dipped mica 50WV 220 pF |
| C445, 472 | K02173100 | Ceramic " CH 10 pF |
| C488, 492 | K06175330 | " " UJ 33 pF |
| C489 | K06175390 | " " UJ 39 pF |
| C404,421,432 | K02175470 | " " CH 47 pF |
| C487 | K06175101 | " " UJ 100 pF |
| C459,464,475 | K02175101 | " " CH 100 pF |
| C401,405,406, 411,413,415, 417,419,420, 423,424,428, 430,431,433, 435,440,442, 443,446,448, 451–455, 460,465,482, 484–486, 490,491,493, 494,497 | K13170103 | " " 0.01 μF |
| C402,403,407, 408,410,412, 414,416,418, 422,425–427, 429,436–438, 441,444,447, 457,458,462, 463,468–471, 473,474,495, 498 | K13170473 | " " 0.047 μF |
| C449 | K14179003 | " " 0.1 μF |
| C461, 467 | K50177103 | Mylar 50WV 0.01 μF |
| C478 | K50177223 | " " 0.022 μF |
| C409,439,456, 466,480,481, 483 | K50177473 | " " 0.047 μF |
| C434 | K70167224 | Tantalum 35WV 0.22 μF |
| C479 | K70127225 | " " 2.2 μF |
| C450,476,496 | K40120106 | Electrolytic 16WV 10 μF |
| | | **INDUCTOR** |
| L401–408,410 | L1190016 | FL-5H 101K 100 μH |
| L411, 412 | L1190038 | FL-5H 271K 270 μH |



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|---|---|---|
| L409 | L0020145 | 5.2 μH #220145 |
| | | **TRANSFORMER** |
| T410 | L0020150 | R12-4074 |
| T402,403,404, 407,409,413, 414 | L0020140 | R12-4170 |
| T401,406,408, 415 | L0020141 | R12-4171 |
| T405 | L0020221 | #220221 |
| T411 | L0020460 | #220460 |
| T412 | L0020209 | #220209 |
| | | **MINI CONNECTOR** |
| J401 | P0090038 | 5048-12A |
| J402 | P0090039 | 5048-13A |
| J403 | P0090040 | 5048-15A |
| TP401–412 | Q5000011 | Wrapping terminal C |

## AF UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019640 | AF unit with components |
| PB-1964A | F0001964A | P.C. Board |
| | | **IC, FET, TRANSISTOR** |
| Q503 | G1090077 | IC MC3403P |
| Q506 | G1090064 | " 34024P CQM |
| Q504 | G1090100 | " SN74LS123N |
| Q502 | G1090086 | " TA7063P |
| Q501 | G1090164 | " μPC2002H |
| Q505 | G1090120 | " NJM78L05 |
| Q514 | G3800190G | FET 2SK19GR |
| Q515 | G3105641 | TR 2SA564A |
| Q511 | G3303730 | " 2SC373 |
| Q507, 508 | G3310000G | " 2SC1000GR |
| Q512 | G3313830 | " 2SC1383 |
| Q509,510,513, 516 | G3318150Y | " 2SC1815Y |
| | | **DIODE** |
| D510, 511 | G2090029 | Ge 1N60 |
| D502–506 | G2010070 | Ge (GB) 1S1007 |
| D507–509, 512–517, 519–522 | G2015550 | Si 1S1555 |

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|---|---|---|
| D501, 518 | G2090001 | Si 10D1 |
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| | | **CRYSTAL** |
| X501 | H0100260 | HC-6/W 3200 kHz #210026 |
| X502 | H0100421 | HC-18/U 8986 kHz #210042-1 |
| X503 | H0100422 | " 8989 kHz #210042-2 |
| X504 | H0100423 | " 8988.3 kHz #210042-3 |
| | | |
| | | |
| | | |
| | | **RESISTOR** |
| R511 | J00245560 | Carbon film 1/4W VJ 56 Ω |
| R509,539,557 | J00245101 | " " " " 100 Ω |
| R533, 546 | J00245151 | " " " " 150 Ω |
| R503,513,524, 525 | J00245221 | " " " " 220 Ω |
| R512,522,538 | J00245471 | " " " " 470 Ω |
| R504,514,520, 523,548,561 | J00245102 | " " " " 1 kΩ |
| R515 | J00245222 | " " " " 2.2 kΩ |
| R534,535,565 | J00245272 | " " " " 2.7 kΩ |
| R510,562,569, 571,578–580 | J00245332 | " " " " 3.3 kΩ |
| R583 | J01245472 | " " " TJ 4.7 kΩ |
| R501,506,531, 536,537,542, 544,545,549, 550,563,566, 575,576,581 | J00245472 | " " " VJ 4.7 kΩ |
| R521,527,532, 541,568,570 | J00245682 | " " " " 6.8 kΩ |
| R507,519,529, 555,556,558, 572 | J00245103 | " " " " 10 kΩ |
| R517, 551 | J00245153 | " " " " 15 kΩ |
| R508,518,528, 540,554,573 | J00245223 | " " " " 22 kΩ |
| R559 | J00245393 | " " " " 39 kΩ |
| R567 | J00245473 | " " " " 47 kΩ |
| R516 | J00245563 | " " " " 56 kΩ |
| R547, 574 | J00245104 | " " " " 100 kΩ |
| R560 | J00245154 | " " " " 150 kΩ |
| R552, 553 | J00245224 | " " " " 220 kΩ |
| R526 | J00245274 | " " " " 270 kΩ |
| R564, 577 | J00245474 | " " " " 470 kΩ |
| R582 | J00245824 | " " " " 820 kΩ |
| R505 | J10276229 | " composition 1/2W GK 2.2Ω |
| R502 | J32276010 | Wire wound 1W 1 Ω |
| | | |
| | | |
| | | |
| | | **POTENTIOMETER** |
| VR501 | J51727101 | CR-19R 100 ΩB |
| | | |
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| | | |
| | | **CAPACITOR** |
| C512 | K30176271 | Dipped mica 50WV 270 pF |

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|---|---|---|
| C513 | K30176511 | Dipped mica 50WV 510 pF |
| C511 | K02172030 | Ceramic 50 WV CH 3 pF |
| C522 | K02173100 | " " " 10 pF |
| C514 | K02179011 | " " " 27 pF |
| C546–548 | K02175390 | " " " 39 pF |
| C510,532,534, 555,566 | K02175101 | " " " 100 pF |
| C533 | K02175151 | " " " 150 pF |
| C558, 559 | K00179020 | " " SL 240 pF |
| C504,519–521, 523,531,535, 542–545, 570 | K13170103 | " " 0.01 μF |
| C509,537 | K13170473 | " " 0.047 μF |
| C516 | K50177102 | Mylar 50 WV 0.001 μF |
| C526 | K50177472 | " " 0.0047 μF |
| C518,529,530, 572 | K50177103 | " " 0.01 μF |
| C525,539–541 | K50177223 | " " 0.022 μF |
| C556,567,569, 573, 574 | K50177473 | " " 0.047 μF |
| C503,528 | K50177104 | " " 0.1 μF |
| C507,517,527, 550,551,560, 568,571 | K40170105 | Electrolytic " 1 μF |
| C557 | K40170225 | " " 2.2 μF |
| C561 | K40170335 | " " 3.3 μF |
| C536 | K40140475 | " 25 WV 4.7 μF |
| C505,515,538, 552,554,564, 565 | K40126106 | " 16 WV 10 μF |
| C524,553,563 | K40126226 | " " 22 μF |
| C508 | K40126476 | " " 47 μF |
| C501 | K40126107 | " " 100 μF |
| C506 | K40126227 | " " 220 μF |
| C502 | K40126477 | " " 470 μF |
| C562 | K40126336 | " " 33 μF |
| | | |
| | | |
| | | **TRIMMER CAPACITOR** |
| TC501–505 | K91000013 | ECV-1ZW 20 x 32 20 pF |
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| | | |
| | | |
| | | **INDUCTOR** |
| L502 | L1190023 | FL-5H 220 22 μH |
| L501 | L1190038 | FL-5H 271 270 μH |
| L503–506 | L1190017 | FL-5H 102 1 mH |
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| | | **TRANSFORMER** |
| T501 | L0020209 | #220209 |
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| | | **RELAY** |
| RL501 | M1190002 | FBR211A D012M |
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|---|---|---|
| | | MINI CONNECTOR |
| J501 | P0090043 | 5048-19A |
| J502 | P0090040 | 5048-15A |
| J503 | P0090037 | 5048-08A |
| J504 | P0090042 | 5048-05A |
| J505 | P0090041 | 5048-03A |
| | R0042800 | HEAT SINK |

## PREMIX LOCAL UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019650 | PREMIX LOCAL unit with components |
| PB-1965 | F0001965 | P.C. Board |
| | | TRANSISTOR |
| Q601–610 | G3303720Y | 2SC372Y |
| | | DIODE |
| D601–610 | G2015550 | Si 1S1555 |
| | | RESISTOR |
| R604,608,612, 616,620,624, 628,632,636, 640 | J00245101 | Carbon film 1/2W VJ 100 Ω |
| R642 | J00245181 | " " " " 180 Ω |
| R603,607,611, 615,619,623, 627,631,635, 639 | J00245102 | " " " " 1 kΩ |
| R641, 643 | J00245122 | " " " " 1.2 kΩ |
| R602,606,610, 614,618,638 | J00245183 | " " " " 18 kΩ |
| R622,626,630, 634 | J00245333 | " " " " 33 kΩ |
| R601,605,609, 613,617,621, 625,629,633, 637 | J00245563 | " " " " 56 kΩ |
| | | CAPACITOR |
| C604 | K30176331 | Dipped mica 50WV CH 330 pF |
| C624,628,632, 636 | K02175470 | Ceramic " CH 47 pF |
| C620 | K02175680 | " " " 68 pF |
| C616 | K02175101 | " " " 100 pF |
| C612 | K02179023 | Ceramic 50WV CH 180 pF |
| C640 | K02179026 | " " " 240 pF |
| C608 | K02179027 | " " " 270 pF |
| C601–603, 605–607, 609–611, 613–615, 617–619, 621–623, 625–627, 629–631, 633–635, 637–639, 641 | K13170103 | " " 0.01 μF |
| | | CRYSTAL |
| X601 | H0100411 | HC-18/U 15.9875 MHz #210147 |
| X602 | H0101480 | " 17.9875 MHz #210148 |
| X603 | H0101490 | " 21.4875 MHz #210149 |
| X604 | H0101500 | " 28.4875 MHz #210150 |
| X605 | H0101510 | " 35.4875 MHz #210151 |
| X606 | H0101520 | " 42.4875 MHz #210152 |
| X607 | H0101530 | " 42.9875 MHz #210153 |
| X608 | H0101540 | " 43.4875 MHz #210154 |
| X609 | H0101550 | " 43.9875 MHz #210155 |
| X610 | H0101560 | " 19.4875 MHz #210156 |
| | | TRANSFORMER |
| T601–610 | L0020017 | #220017 |



## SELECT SWITCH UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019660 | SELECT SW unit with components |
| PB-1966C | F0001966C | P.C. Board |
| | | DIODE |
| D701 | G2090001 | Si 10D1 |
| | | RELAY |
| RL701 | M1190002 | FBR211A D012M |
| | | SWITCH |
| S701 | M4090006 | 6B0003CC2060 |

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|---|---|---|
| | | **MINI CONNECTOR** |
| J701 | P0090049 | 5048-16A |

## VFO UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0014400 | VFO assembly 3420 |
| | | PCB with components |
| PB-1440B | F0001440B | P.C. Board |
| | | **FET & TRANSISTOR** |
| Q802 | G3800190G | FET 2SK19GR |
| Q801, 803 | G3303720Y | Transistor 2SC372Y |
| | | **DIODE** |
| D801 | G2022360 | Varactor 1S2236 |
| | | **RESISTOR** |
| R809, 811 | J00245101 | Carbon film 1/4W VJ 100 Ω |
| R807 | J00245221 | " " " " 220 Ω |
| R805, 808 | J00245222 | " " " " 2.2 kΩ |
| R802 | J00245332 | " " " " 3.3 kΩ |
| R801 | J00245103 | " " " " 10 kΩ |
| R803 | J00245183 | " " " " 18 kΩ |
| R804 | J00245223 | " " " " 22 kΩ |
| R806, 810 | J00245104 | " " " " 100 kΩ |
| | | **CAPACITOR** |
| C807 | K02173080 | Ceramic disc 50WV CH 8 pF |
| C801 | K06173080 | " " " UJ 8 pF |
| C803 | K06175120 | " " " " 12 pF |
| C804 | K02175180 | " " " CH 18 pF |
| C805, 814 | K02179013 | " " " " 33 pF |
| C808, 818 | K02175390 | " " " " 39 pF |
| C811 | K02179023 | " " " " 180 pF |
| C809,810,812, 815,819,820, 824,826 | K13170103 | " " " " 0.01 μF |
| C813 | K30176431 | Dipped mica " 430 pF |
| C821, 823 | K30176471 | " " " 470 pF |
| C802, 822 | K30209001 | " " " 1000 pF |
| C825 | K70167334 | Tantalum 10WV 0.33 μF |
| | | **VARIABLE CAPACITOR** |
| VC801 | K90000024 | C521 R112 |

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|---|---|---|
| | | **TRIMMER CAPACITOR** |
| TC801 | K90000001 | TSN-100D15 15 pF |
| TC802 | K91000016 | ECV-1ZW 50 x 32 50 pF |
| | | **INDUCTOR** |
| L801 | L0020268 | ≠220268 |
| L804, 805 | L1190007 | Micro inductor FL-4H 1.8 μH |
| L803, 806 | L1190001 | " " 250 μH |
| L802 | L1190040 | " " S4 102K 1 mH |
| | | **RECEPTACLE** |
| J801 | P1090012 | SI-6303-1 |
| | | **TERMINAL** |
| | Q5000005 | Lighthouse type |
| | Q5000011 | Wrapping terminal C |

## RECT. B UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019670 | RECT. A unit with components |
| PB-1967 | F0001967 | P.C. Board |
| | | **IC, TRANSISTOR** |
| Q901 | G1090162 | IC μPC78L12 |
| Q903 | G31049500 | TR 2SA495(O) |
| | | **DIODE** |
| D907 | G2090001 | Si 10D1 |
| D901–904 | G2090002 | " 10D10 |
| D905, 906 | G2090003 | " V06B |
| D908 | G2090007 | Zener WZ061 |
| | | **RESISTOR** |
| R908 | J01245560 | Carbon film 1/4W TJ 56 Ω |
| R905 | J10276220 | " composition 1/2W GK 22 Ω |
| R901–904 | J10276474 | " " " 470 kΩ |
| R907 | J20339001 | Metallic film 2W 0.4 Ω |
| | | **CAPACITOR** |
| C901–905 | K13170103 | Ceramic 50WV 0.01 μF |
| C908–911 | K40140106 | Electrolytic 25WV 10 μF |
| C907 | K40140107 | " " 100 μF |

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|---|---|---|
| C906 | K41140338 | Electrolytic 25WV 3300 µF |
| | | **RELAY** |
| RL901 | M1190003 | FRL-264 D012/04CS-01 |
| | Q5000011 | Wrapping terminal C |
| | Q5000004 | Test point D |

## RECT. B UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019680 | RECT. B unit with components |
| PB-1968B | F0001968B | P.C. Board |
| | | **TRANSISTOR** |
| Q1003 | G3106390 | 2SA639 |
| Q1001 | G3107330 | 2SA733 |
| Q1002 | G3303720Y | 2SC372Y |
| | | **DIODE** |
| D1004, 1005, 1008–1011 | G2015550 | Si 1S1555 |
| D1002, 1003, 1012 | G2090002 | " 10D10 |
| D1006, 1007 | G2090001 | " 10D1 |
| D1001 | G2090081 | " SM1-12 |
| | | **RESISTOR** |
| R1021 | J00245102 | Carbon film 1/4W VJ 1 kΩ |
| R1011, 1016, 1020 | J00245472 | " " " " 4.7 kΩ |
| R1013, 1015 | J00245103 | " " " " 10 kΩ |
| R1014 | J00245123 | " " " " 12 kΩ |
| R1017–1019 | J00245223 | " " " " 22 kΩ |
| R1012 | J00245563 | " " " " 56 kΩ |
| R1010 | J20306562 | Metallic film 1W 5.6 kΩ |
| R1022 | J20306390 | " " " 39 Ω |
| R1005 | J20336391 | " " 2W 390 Ω |
| R1006 | J20336471 | " " " 470 Ω |
| R1008 | J20336222 | " " " 2.2 kΩ |
| R1007 | J20336332 | " " " 3.3 kΩ |
| R1009 | J20336473 | " " " 47 kΩ |
| R1023 | J10276474 | Carbon composition ½W GK 470 kΩ |
| | | **POTENTIOMETER** |
| VR1001 | J50708103 | V18K3-2 10 kΩB |

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|---|---|---|
| | | **CAPACITOR** |
| C1017 | K13170473 | Ceramic 50WV 0.047 µF |
| C1016 | K12279003 | " 500WV 0.0022 µF |
| C1005, 1006, 1013–1015, 1018 | K12279004 | " " 0.0047 µF |
| C1010 | K12279002 | " " 0.01 µF |
| C1009 | K40240106 | Electrolytic 250WV 10 µF |
| C1011 | K40240336 | " " 33 µF |
| C1012 | K40240476 | " " 47 µF |
| C1001–1004 | K40270106 | " 450WV 10 µF |
| C1007, 1008 | K40260226 | " 350WV 22 µF |
| | Q5000011 | Wrapping terminal C |

## CAPACITOR UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019690 | CAPACITOR unit with components |
| PB-1969A | F0001969A | P.C. Board |
| | | **RESISTOR** |
| R1101, 1102 | J10276474 | Carbon composition 1/2W GK 470kΩ |
| | | **CAPACITOR** |
| C1101, 1102 | K43270003 | Electrolytic 500WV 200 µF (CE-62LW) |

## TRIMMER A UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019700 | TRIMMER A unit with components |
| PB-1970 | F0001970 | P.C. Board |
| | | **CAPACITOR** |
| C1203 | K30176331 | Dipped mica 50WV 330 pF |
| C1208 | K30176391 | " " " 390 pF |
| C1202 | K30176651 | " " " 650 pF |
| C1207 | K30209001 | " " " 1000 pF |
| C1201 | K30209003 | " " " 1500 pF |
| C1206 | K02173100 | Ceramic 50WV CH 10 pF |
| C1205 | K02179012 | " " " 30 pF |
| C1204 | K02175820 | " " " 82 pF |

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|---|---|---|
| | | TRIMMER CAPACITOR |
| TC1203 | K91000032 | B2PY 100 pF |
| TC1202 | K91000052 | B4PY 220 pF |
| TC1201 | K91000033 | B7PY 470 pF |
| TC1206 | K91000013 | ECV-1ZW 20 x 32 20 pF |
| TC1204, 1205 | K91000016 | " 50 x 32 50 pF |
| | | INDUCTOR |
| L1201 | L0020545 | Trap coil =220545 |

## TRIMMER B BOARD

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019701 | TRIMMER B unit with components |
| PB-1970 | F0001970 | P.C. Board |
| | | CAPACITOR |
| C1303 | K30176271 | Dipped mica 50WV 270 pF |
| C1306 | K30176391 | " " " 390 pF |
| C1302 | K30176621 | " " " 620 pF |
| C1301 | K30209003 | " " " 1500 pF |
| C1305 | K02173080 | Ceramic 50WV CH 8 pF |
| C1304 | K02175680 | " " " 68 pF |
| | | TRIMMER CAPACITOR |
| TC1303 | K91000032 | B2PY 100 pF |
| TC1302 | K91000052 | B4PY 220 pF |
| TC1301 | K91000033 | B7PY 420 pF |
| TC1306 | K91000012 | ECV-1ZW 10 x 32 10 pF |
| TC1304, 1305 | K91000016 | " 50 x 32 50 pF |
| | | INDUCTOR |
| L1301 | L0020261 | Trap coil #220261 |



## TRIMMER C BOARD

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0010920 | TRIMMER C unit with components |
| PB-1092 | F1001092 | P.C. Board |
| | | CAPACITOR |
| C1406 | K30276100 | Dipped mica 500WV 10 pF |
| C1405 | K30276820 | " " " 82 pF |
| C1403 | K30276271 | " " " 270 pF |
| C1407 | K30276391 | Dipped mica 500WV 390 pF |
| C1402 | K30276651 | " " " 650 pF |
| C1401 | K30279055 | " " " 1500 pF |
| | | TRIMMER CAPACITOR |
| TC1404, 1405 | K91000031 | B1PY 40 pF |
| TC1402, 1403 | K91000032 | B2PY 100 pF |
| TC1401 | K91000033 | B7PY 420 pF |

## BAND WIDTH CONTROL UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019720 | B.W. CONT. unit with components |
| PB-1972 | F0001972 | P.C. Board |
| | | LED |
| D1501 | G2090060 | GD4-203 SRD |
| | | RESISTOR |
| R1501 | J00245152 | Carbon film 1/4W VJ 1.5 kΩ |
| | | POTENTIOMETER |
| VR1501 | J50710502 | V10K8-1-2 5 kΩB |
| | | SWITCH |
| S1501 | N4090008 | 1B0001AC2060 |

## DRIVER BOARD

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0017140 | Driver board with components (without vacuum tube) |
| PB-1714A | F0001714A | P.C. Board |
| | | VACUUM TUBE |
| V1601 | G6090002 | 12BY7A |
| | | VACUUM TUBE SOCKET |
| VS1601 | P3090022 | SB-9403 |

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|---|---|---|
| | | **RESISTOR** |
| R1605 | J10276470 | Carbon composition 1/2W GK 47 Ω |
| R1602, 1604 | J10276560 | 〃 〃 〃 〃 56 Ω |
| R1603 | J10276101 | 〃 〃 〃 〃 100 Ω |
| R1601 | J10276473 | 〃 〃 〃 〃 47 kΩ |
| | | **CAPACITOR** |
| C1601, 1602 | K12279002 | Ceramic disc 500WV 0.01 μF |
| C1603, 1604, 1606 | K13170473 | 〃 〃 50WV 0.047 μF |
| C1605 | K30279051 | Dipped mica 500WV 1000 pF |
| | | **INDUCTOR** |
| L1601 | L1190020 | Micro inductor FL5H 150 μH |
| L1602(R1602) | L1020029 | #220029 |
| | Q5000011 | Wrapping terminal C |

## FINAL BOARD

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0017151 | Final board with components (without vacuum tube) |
| PB-1715B | F0001715B | P.C. Board |
| | | **VACUUM TUBE** |
| V1701, 1702 | G6090001 | 6146B |
| | | **VACUUM TUBE SOCKET** |
| VS1701, 1702 | P3090024 | SB-3606 |
| | | **DIODE** |
| D1701 | G2090002 | Si 10D10 |
| | | **RESISTOR** |
| R1701, 1702 (L1702, 1703) | J10276560 | Carbon composition 1/2W GK 56 Ω |
| R1703, 1704, 1705 | J10276101 | 〃 〃 〃 〃 100 Ω |
| R1706 | J31333010 | Meter shunt 2W 1 Ω |

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|---|---|---|
| | | **CAPACITOR** |
| C1703 | K12279001 | Ceramic disc 500WV 0.001 μF |
| C1704, 1710 | K12279002 | 〃 〃 〃 0.01 μF |
| C1705–1709, 1711, 1712 | K13170473 | 〃 〃 50WV 0.047 μF |
| C1701 | K31306102 | Moulded mica 1kWV 1000 pF |
| C1702 | K30273050 | Dipped mica 500WV 5 pF |
| | | **INDUCTOR** |
| L1701 | L1190020 | Micro inductor 150 μH |
| L1704 | L1190039 | 〃 〃 560 μH |
| L1702, 1703 (R1701,1702) | L1020307 | RF choke #220307 |
| | Q5000011 | Wrapping terminal C |

## CLARIFIER CONTROL UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019730 | CLAR.CONT. unit with components |
| PB-1973B | F0001973B | P.C. Board |
| | | **DIODE** |
| D1801 | G2090001 | Si 10D1 |
| D1802 | G2090060 | LED GD4-203SRD |
| | | **RESISTOR** |
| R1803 | J00245102 | Carbon film 1/4W VJ 1 kΩ |
| R1804, 1805 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R1802 | J00245332 | 〃 〃 〃 〃 3.3 kΩ |
| R1801 | J00245472 | 〃 〃 〃 〃 4.7 kΩ |
| | | **POTENTIOMETER** |
| VR1801 | J50710501 | V10K8-1-2 500 ΩB |
| | | **CAPACITOR** |
| C1801–1803 | K13170473 | Ceramic 50WV 0.047 μF |
| | | **RELAY** |
| RL1801 | M1190002 | FBR211A D012M |

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|---|---|---|
| | | **SWITCH** |
| SW1801 | N4090011 | 2B0005FC206 |

## LED BOARD

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019740 | LED board with components |
| PB-1974A | F0001974A | P.C. Board |
| | | **LED** |
| D1901–1906 | G2090060 | GD4-203SRD |
| | | **RESISTOR** |
| R1901, 1902 | J01245102 | Carbon film 1/4W TJ 1 kΩ |

## LEVER SWITCH BOARD

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019750 | LEVER SW board with components |
| PB-1975A | F0001975A | P.C. Board |
| | | **RESISTOR** |
| R2006 | J01245560 | Carbon film 1/4W TJ 56 Ω |
| R2005 | J01245101 | 〃 〃 〃 〃 100 Ω |
| R2001 | J01245121 | 〃 〃 〃 〃 120 Ω |
| R2002 | J01245391 | 〃 〃 〃 〃 390 Ω |
| R2008 | J01245562 | 〃 〃 〃 〃 5.6 kΩ |
| R2004 | J00245683 | 〃 〃 〃 VJ 68 kΩ |
| | | **SWITCH** |
| S2001–2004 | N3090002 | SLE62301 |
| S2005 | N3090008 | SLE64251 |

## COUNTER UNIT

| Symbol No. | Parts No. | Description |
|---|---|---|
| | C0019800 | COUNTER unit assembly |
| PB-1978 | | (Display board) |
| PB-1979 | | (Count, decode board) |
| PB-1980A▲ | | (Main board)<br>▲655.36 kHz CRYSTAL TYPE |
| PB-1980B★ | | (Main board)<br>★6553.6 kHz CRYSTAL TYPE |

| | | |
|---|---|---|
| | | ★★★★★ **DISPLAY board** ★★★★★ |
| PB-1978 | F0001978 | P.C. Board |
| | | **DISPLAY LED** |
| DS2101-2106 | G2090069 | HP5082-7623 |
| | | **SOCKET** |
| QS2101–2106 | P3090038 | 314AG-37D |
| | | ★★★★★ **COUNT. DECODE board** ★★★★★ |
| PB-1979 | F0001979 | P.C. Board |
| | | **IC, TRANSISTOR** |
| Q2208–2213 | G1090046 | IC MSM561RS |
| Q2202–2207 | G1090033 | 〃 SN74LS196N |
| Q2201 | G3104960Y | TR 2SA496Y |
| | | **RESISTOR** |
| R2204–2245 | J00245101 | Carbon film 1/4W VJ 100 Ω |
| R2203 | J00245181 | 〃 〃 〃 〃 180 Ω |
| R2202 | J00245271 | 〃 〃 〃 〃 270 Ω |
| R2201 | J00245471 | 〃 〃 〃 〃 470 Ω |
| | | **CAPACITOR** |
| C2201 | K13179001 | Ceramic 50WV 0.01 μF |
| C2202–2204 | K71137685 | Tantalum 6.3WV 6.8 μF |
| | | **CONNECTOR** |
| J2201 | P1090043 | 3024-13C |
| | Q5000007 | Board Joint 163740 |
| | | ★★★★★ **COUNTER MAIN board** ★★★★★ |
| PB-1980A▲ | F0001980A | P.C. Board |
| PB-1980B★ | F0001980B | P.C. Board |
| | | **IC, FET, TRANSISTOR** |
| Q2302 | G1090032 | IC MC10116 |
| Q2305 | G1090023 | 〃 MSM5564 |
| Q2309 | G1090033 | 〃 SN74LS196N |
| Q2304 | G1090169 | 〃 SN74S00N |
| Q2306 | G1090093 | 〃 SN74LS04N |
| Q2307, 2308 | G1090079 | 〃 μPA54H |
| Q2310 | G1090065 | 〃 μPC14305 |

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|---|---|---|
| Q2301 | G4800510C | FET 3SK51-03 |
| Q2303 | G3090008 | TR MPS3640 |
| Q2312* | G1090034 | IC SN74LS90N |
| Q2313* | G3303800Y | TR 2SC380TM-Y |
| | | |
| | | |
| | | **DIODE** |
| D2301–2312 | G2015550 | Si 1S1555 |
| | | |
| | | |
| | | **CRYSTAL** |
| X2301▲ | H0100250 | HC-14/W 655.36 kHz |
| X2301* | H0102272 | HC-18/U 6553.6 kHz |
| | | |
| | | |
| | | **RESISTOR** |
| R2316, 2326* | J00245101 | Carbon film 1/4 WS VJ 100 Ω |
| R2301, 2311 | J00245221 | 〃 〃 〃 〃 〃 220 Ω |
| R2319 | J00245331 | 〃 〃 〃 〃 〃 330 Ω |
| R2305, 2317 | J00245471 | 〃 〃 〃 〃 〃 470 Ω |
| R2308–2310, 2312, 2314, 2322 | J00245511 | 〃 〃 〃 〃 〃 510 Ω |
| R2304, 2313, 2315, 2325* | J00245102 | 〃 〃 〃 〃 〃 1 kΩ |
| R2306, 2307 | J00345222 | 〃 〃 〃 〃 〃 2.2 kΩ |
| R2327* | J00245392 | 〃 〃 〃 〃 〃 3.9 kΩ |
| R2302 | J00245103 | 〃 〃 〃 〃 〃 10 kΩ |
| R2303, 2323*, 2324* | J00245153 | 〃 〃 〃 〃 〃 15 kΩ |
| R2321 | J00245223 | 〃 〃 〃 〃 〃 22 kΩ |
| R2320 | J00245473 | 〃 〃 〃 〃 〃 47 kΩ |
| R2318 | J00245104 | 〃 〃 〃 〃 〃 100 kΩ |
| | | |
| | | |
| | | **BLOCK RESISTOR** |
| RB2301 | J40900001 | RK1/16B8R 4.7 kΩ |
| | | |
| | | |
| | | **CAPACITOR** |
| C2308 | K02175120 | Ceramic 50WV CH 12 pF |
| C2311▲ | K06175150 | 〃 〃 UJ 15 pF |
| C2324* | K06175270 | 〃 〃 〃 27 pF |
| C2312▲ | K06175470 | 〃 〃 CH 47 pF |
| C2325* | K02175151 | 〃 〃 〃 150 pF |
| C2326* | K06179018 | 〃 〃 UJ 330 pF |
| C2301–2305 | K13179001 | 〃 〃 0.01 μF |
| C2324–2326▲ | K13170473 | 〃 〃 0.047 μF |
| C2314, 2315 | K51176331 | Styrol 〃 330 pF |
| C2323 | K50177102 | Mylar 〃 0.001 μF |
| C2316 | K50177332 | 〃 〃 0.0033 μF |
| C2317 | K50177103 | 〃 〃 0.01 μF |
| C2327–2330* | K13179001 | 〃 〃 0.01 μF |
| C2313, 2331*–2333 | K50177473 | 〃 〃 0.047 μF |
| C2306, 2307, 2309 | K70127106 | Tantalum 16WV 10 μF |
| C2310 | K40129001 | Electrolytic 〃 330 μF |
| C2318–2322 | K21170002 | Feed thru 50WV 0.001 μF |
| | | |

| | | |
|---|---|---|
| | | **TRIMMER CAPACITOR** |
| TC2301▲ | K9100030 | ECV-1ZW 40 x 53 40 pF |
| TC2302* | K91000029 | ECV-1ZW 20 x 53 20 pF |
| | | |
| | | |
| | | **INDUCTOR** |
| L2301 | L1020012 | 35 μH #220012 |
| L2302 | L1190020 | 150 μH |
| | | |
| | | |
| | | **SWITCH** |
| S2301, 2302 | N7090016 | DSS208 |
| | | |
| | | |
| | | **PLUG** |
| P2301 | P0090045 | SQ4052 |
| P2302 (with wire) | T9201360 | 1625-09P-1 #240136 |
| | | |
| | | |
| J2301 | P0090044 | 3022-13A |
| J2302 | P9201380A | 3021-03 #240138A |

**DC-DC CONVERTER (OPTION)**

| Symbol No. | Parts No. | Description |
|---|---|---|
| | | **TRANSISTOR** |
| Q3201, 3202 | G3090002 | T20A6 with insulator |
| | | |
| | | **RESISTOR** |
| R3202 | J31306339 | Wire wound 1W 3.3 Ω |
| R3201 | J20376221 | Metallic film 5W 220 Ω |
| | | |
| | | |
| | | **CAPACITOR** |
| C3202 | K52247474 | Metallized paper 250WV 0.047 μF |
| C3201 | K41140227 | Electrolytic 25WV 220 μF |
| | | |
| | | |
| | | **CONNECTOR** |
| P3201 | P0090066 | AC9M |
| | | |
| | T9012720 | DC POWER CORD |
| | Q0000009 | FUSE 20 A |
| | | |

**ACCESSORIES**

| Symbol No. | Parts No. | Description |
|---|---|---|
| | | **AC POWER CORD** |
| | T9012380A | 2 wire, 2 prong plug |
| | T9012481A | 3 wire without plug |
| | T9012582A | 3 wire, 3 prong plug (UL) |
| | T9012484 | 3 wire, 3 prong Australian plug |
| | T9012683A | 3 wire, 2 prong EU plug |
| | P0090065 | CONNECTOR PLUG QS-P6FL |
| | P0090018 | **PIN PLUG** STP58 |
| | P0090035 | **ACC PLUG** PA602B04 |
| | Q0000005 | **FUSE** (100V–117V) 5A |
| | Q0000004 | 〃 (200V–234V) 3A |
| | | |

# SECTION 5 – LATE MODEL UPDATE

# HIGH–PERFORMANCE HF TRANSCEIVER
# YAESU FT-101ZD



## GENERAL DESCRIPTION

The FT-101ZD is a precision engineered, high-performance HF transceiver of advanced design, providing all band (160 - 10 meters) operation on SSB, CW, and AM* or FM*. This transceiver operates at an input power of 180 watts.

Advanced features include digital plus analog frequency display, continuously variable IF bandwidth (300 Hz - 2.4 kHz), a superb noise blanker with threshold adjustment, and an effective RF speech processor. The receiver boasts excellent dynamic range, despite its high sensitivity, for reliable operation in the presence of strong signals.

Built into every FT-101ZD are VOX, semi-break-in CW with sidetone, a 25 kHz crystal calibrator, selectable AGC, and a 10 dB/20 dB RF attenuator in the incoming signal path.

The FT-101ZD has been engineered for use. Controls and switches are laid out in an efficient and logical manner, so you won't have to fumble for a switch or knob when you need it quickly. And Yaesu designers have now made it possible for you to switch sidebands without recalibrating the display.

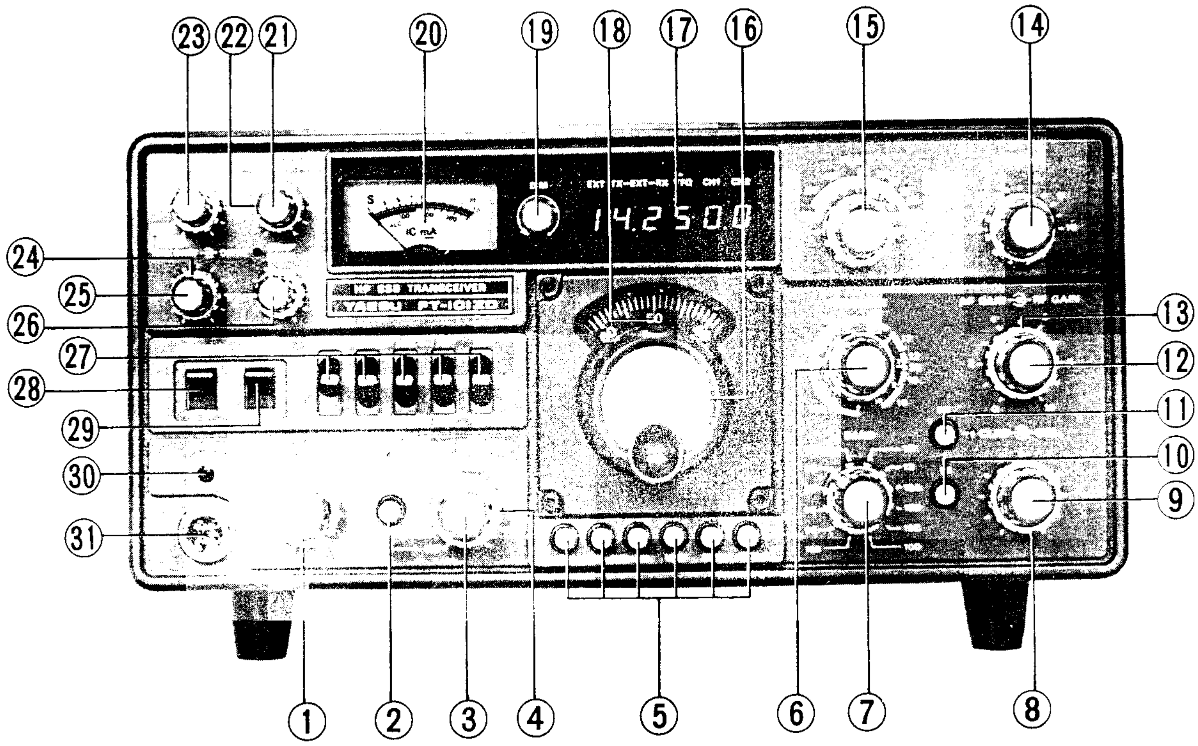
* option

All circuits, except the transmitter driver and final amplifier stages, are solid state. Solid state devices provide extremely high reliability and high component density, along with low power drain. The FT-101ZD may be operated from a variety of AC voltages, from 100 to 234 volts. A DC-DC converter, providing operation from a 13.5 VDC power source, is an available option.

For the economy FT-101Z, the counter unit is an available option, providing digital display capability, should you want to upgrade your transceiver at a later date. Optional equipment on both models FT-101ZD and FT-101Z are the cooling fan, DC-DC converter, 600 Hz/350 Hz CW filter, AM unit, FM unit, and microphone.

A diecast front panel, and the heavy-duty case, provide maximum protection for your transceiver. If the ratings of this unit are not exceeded, it will provide the owner with many years of satisfying operation. Please read this manual carefully before commencing operation, in order to derive maximum satisfaction from your new YAESU transceiver.

# CONTROLS AND SWITCHES




## (1) MODE

Selection of LSB, USB, CW-W (SSB filter), CW-N (optional CW filter) and AM* or FM* is provided.

## (2) APF/NOTCH switch

This switch selects either the Audio Peak Filter (APF) or the Audio Notch Filter. When pressed, the Audio Notch Filter function is activated.

## (3) APF/NOTCH

The APF/NOTCH control varies the frequency response of the audio peak/notch filter. The peak/notch filter may be varied over the range 350 Hz – 1500 Hz. When rotated into the OFF position, the APF/NOTCH function is switched off.

## (4) WIDTH

This control varies IF bandwidth (except on AM and FM) from 2.4 kHz down to 600 Hz.

## (5) SELECT switches

When using the optional FV-101DM synthesized, scanning external VFO, these switches determine which component will control the transmit, receive, or transceive frequency.

EXT . . . . . . This switch, when pressed, shifts control of the transceive frequency to the external VFO.

* with optional unit

TX EXT. . . This switch, when pressed, shifts control of the transmit frequency to the external VFO.

RX EXT. . . This switch, when pressed, shifts control of the receive frequency to the external VFO.

VFO. . . . . . This switch selects control of the transceive frequency on the FT-101ZD internal VFO.

CH1, CH2. . These switches select optional fixed channels, transceive only.

## (6) PRESELECT

The preselector control peaks the RF and IF stages for the frequency in use.

## (7) BAND

The bandswitch selects the frequency band in use: 160 - 10 meters.

## (8) SQL

The SQL (Squelch) control will silence the receiver until a signal is received. The SQL control can be used only when the FM unit is installed.

## (9) CLARIFIER

The clarifier control allows offset of ±2.5 kHz from the frequency established by the main tuning dial.

### (10) (11) CLARIFIER SELECT switches

Press the RX button for offset of the receive frequency.
Press the TX button for offset of the transmit frequency.
Press both buttons for offset of the transceive frequency.

### (12) AF GAIN

The AF GAIN control varies the output level of the audio amplifier stages. Clockwise rotation increases the audio output level.

### (13) RF GAIN

The RF GAIN control varies the gain of the RF and IF stages. Clockwise rotation increases the gain of these stages.

### (14) LOADING

This control tunes the output circuit of the final amplifier pi network to match the feedpoint impedance of the load.

### (15) PLATE

This control tunes the plate circuit of the final amplifier.

### (16) MAIN TUNING KNOB

Rotation of this knob selects the operating frequency, in conjunction with the setting of the bandswitch. One revolution of the dial produces a frequency change of approximately 17 kHz.

### (17) DIGITAL DISPLAY

The digital display reads out the operating frequency, with resolution to 100 Hz. The display unit is built into the FT-101ZD, and is an available option for the FT-101Z.

### (18) ANALOG DIAL

The analog dial allows readout of the operating frequency to better than 1 kHz. The combination of the precision dial mechanism and drive unit provides zero backlash at slow tuning rates.

### (19) DIM

This control allows dimming of the meter and dial lamps.

### (20) METER

The meter displays final amplifier cathode current (IC), relative power output (PO), and ALC feedback voltage.

### (21) NB

This control varies the threshold point for the noise blanker, and should be set to the minimum point that provides the desired blanking action.

### (22) DELAY

This control sets the delay time for the VOX relay. For voice-actuated SSB, or semi-break-in CW, the operator may select the delay time most suitable for his or her operating habits.

### (23) VOX GAIN

The threshold level for the VOX (voice operated relay) system can be varied using this control. In the PTT position, PTT (push to talk) control is provided, for relay control via the microphone PTT switch or footswitch.

### (24) DRIVE

This control sets the carrier level for CW/AM and tuning purposes. When the RF processor is ON, this control varies the RF output on SSB, as well.

### (25) MIC GAIN

This control sets the output level of the microphone amplifier stage. Clockwise rotation increases the mic gain level.

### (26) COMP LEVEL

This control varies the compression level for the built-in RF speech processor. The processor does not function in the AM/FM mode.

### (27) FUNCTION switches

PROC ........ This switch activates the RF speech processor.

ATT .......... This switch allows the insertion of 10 or 20 dB attenuators in the incoming signal path.

AGC S/F/OFF .. This switch allows selection of the desired AGC decay time. In the OFF position, the AGC is switched off, and the S-meter will not function.

PO/IC/ALC .... In the PO position, relative power output is displayed on the meter. In the IC position, final amplifier cathode current is displayed. In the ALC position, ALC voltage is displayed. Regardless of the setting of the meter switch, the meter functions as an S-meter on receive.

NB/MARK..... In the NB position, the noise blanker is activated. In the MARK position, the internal crystal calibrator is activated.

(28) **POWER**

This is the main ON/OFF switch for the transceiver.

(29) **HEATER**

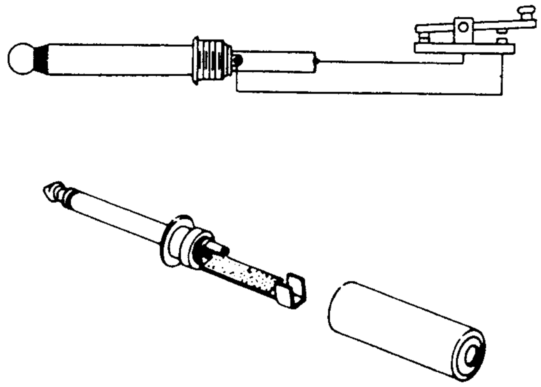
With the HEATER switch on, heater voltage is applied to the driver and final amplifier tubes. This switch may be turned off during periods of RX, when energy conservation is critical.

(30) **PHONES**

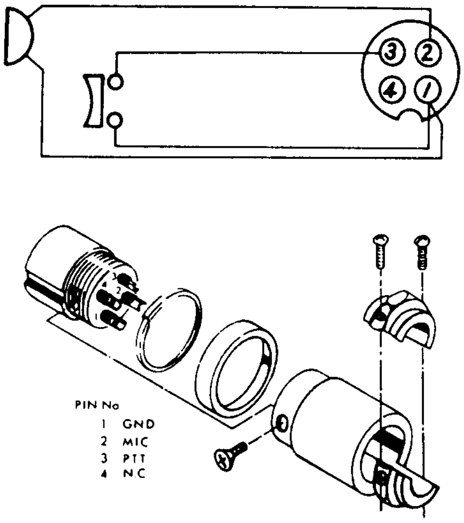
This is a standard ¼" phone jack for use with headphones.

(31) **MIC**

This is a 4 conductor jack for microphone and PTT input.

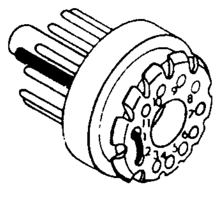


Key plug



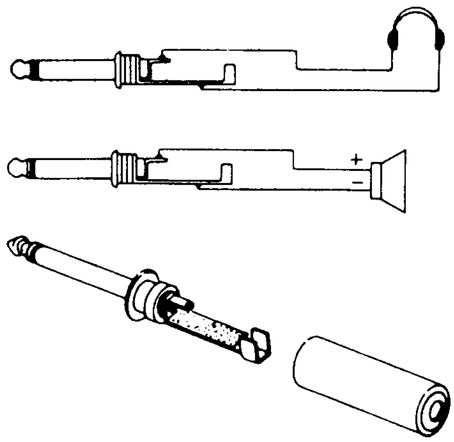

Mic plug



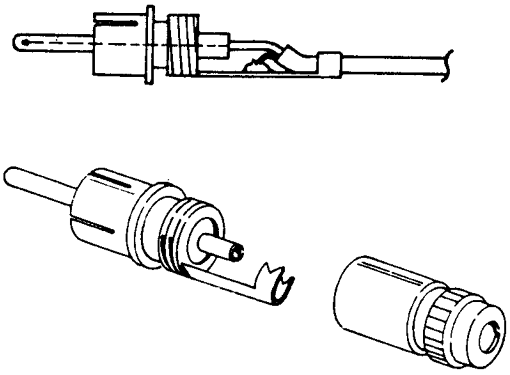


PIN No.
1 HEATER
2 HEATER
3 NC
4 NC
5 NC
6 NC
7 ALC
8 GND
9 TX GND
10 RX GND
11 NC

ACC plug

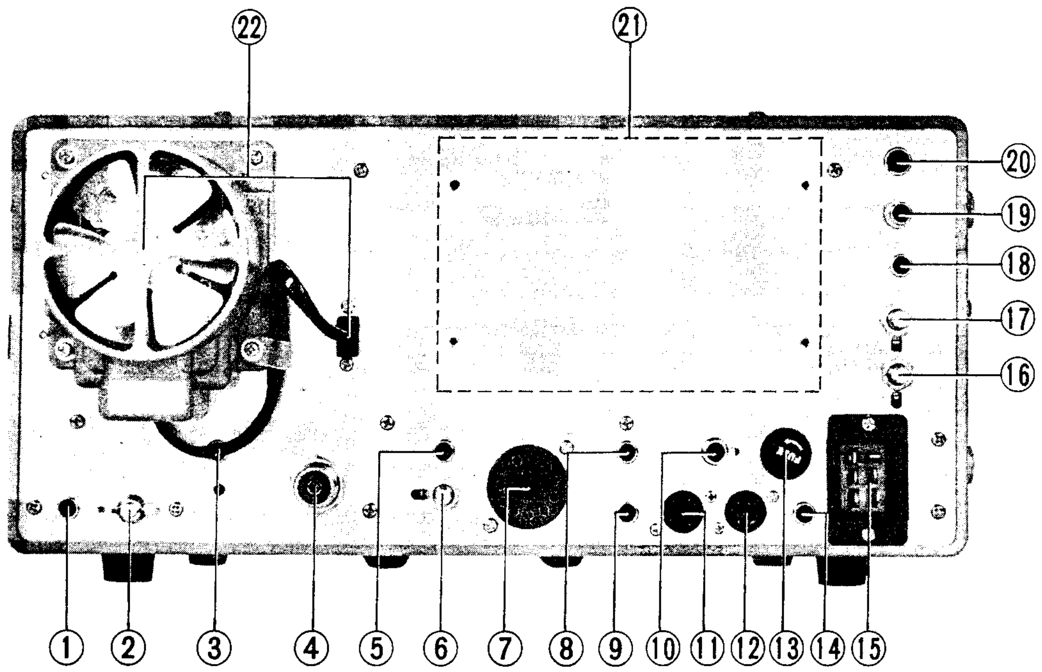


Headphone and external speaker plug



Pin plug

# REAR APRON




### (1) RF OUT

RF output of 3 volts RMS is available at this jack for use with a transverter. Output is from the driver stage.

### (2) GND

For best transceiver performance, as well as protection from electrical shock, a good ground connection should be made at this point, using a heavy, braided wire of the shortest length possible.

### (3) RCV ANT

This jack is switched in parallel with the ANT jack on receive, for use with an external receiver.

### (4) ANT

Standard "UHF" connector for the antenna.

### (5) AF OUT

This is an audio output jack, providing 200 mV of audio output for recording purposes. This jack is not disabled by insertion of a headphone or speaker plug into their respective jacks.

### (6) PO ADJ

This control adjusts the relative power output meter.

### (7) ACC

ALC voltage and relay connections can be made through the accessory jack.

Please insert the ACC plug at all times, to provide heater voltage for the final amplifier tubes.

### (8) TONE OUT

The CW sidetone may be fed to an external receiver through this jack.

### (9) A TRIP IN

Anti-trip input from an external receiver may be made via this jack, to prevent the receiver audio output from tripping the FT-101ZD VOX.

### (10) KEY

The CW key may be connected at this point. Key-up voltage is 7 volts, and key-down current is 1.5 mA. Be sure your electronic keyer's output switch will handle these levels.

### (11) EXT VFO A

This is a 8 pin DIN jack for interconnection to the FV-101DM external digital VFO.

### (12) EXT VFO B

This is a 6 pin DIN jack for interconnection to the FV-101Z, FV-901DM and FV-101DM external VFO.

### (13) FUSE

This is the fuse holder. For 100 - 117 volts, replace with only a 5 amp fuse. For 200 - 234 volts, use a 3 amp fuse. Replace fuses only with a fuse of the proper rating.

(14) IF OUT

Wideband IF output is available at this jack for use with a spectrum analyzer, etc.

(15) POWER

Connect the AC power cord at this point, being certain that your AC supply voltage matches the voltage specification for your transceiver. See the transformer primary connection chart. When using the optional DC-DC converter, the DC supply is connected at this point. DO NOT CONNECT THE AC POWER CORD TO A DC POWER SOURCE. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY SUCH IMPROPER POWER CONNECTIONS.

(16) TONE

This control varies the CW sidetone output level.

(17) A TRIP

This control varies the level of the VOX anti-trip circuit.

(18) PTT

External control of the transceiver PTT (push to talk) system may be made at this jack, for use with a footswitch, etc.

(19) PATCH

Microphone or phone patch input may be made at this jack. Impedance is 500 ohms.

(20) EXT SP

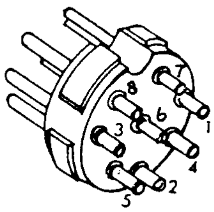
This is a miniature phone jack for speaker output. When a plug is inserted into this jack, the transceiver internal speaker will be cut off. Impedance is 4 - 16 ohms.

(21) DC-DC CONVERTER (OPTION)

The optional DC-DC converter allows operation from a 13.5 volt DC power source.

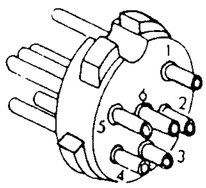
(22) COOLING FAN (OPTION)

The optional cooling fan keeps the tubes at a safe operating temperature, when they are used in a hot environment. The 2 pin fan power jack supplies 100 volts to the fan.



| PIN No | |
|---|---|
| 1 | 12V |
| 2 | USB 8V |
| 3 | VFO 6V |
| 4 | +500kHz SHIFT |
| 5 | LSB 8V |
| 6 | TX EXT |
| 7 | D VFO OUT |
| 8 | XCVR VFO IN |

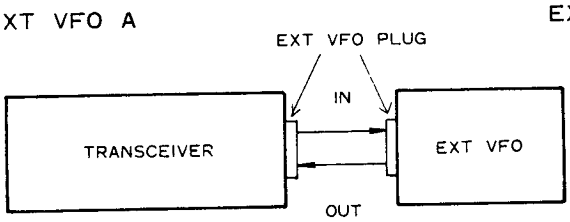
EXT VFO A



| PIN No | |
|---|---|
| 1 | VFO OUT (FV-101Z, FV-901DM)<br>NC (FV-101DM) |
| 2 | GND |
| 3 | EXT 6V IN |
| 4 | AGC IN (FV-901DM) |
| 5 | TX 12V IN |
| 6 | GND (FV-101Z, FV-901DM)<br>RX EXT (FV-101DM) |

EXT VFO B






EXTERNAL VFO PLUG CONNECTIONS

## ACCESSORIES

The following accessories are included with your new transceiver:

(1) AC POWER CORD 1 pc.

The power cord comes equipped with a 6-prong connector for connection to the AC supply.

(2) ACC PLUG 1 pc.

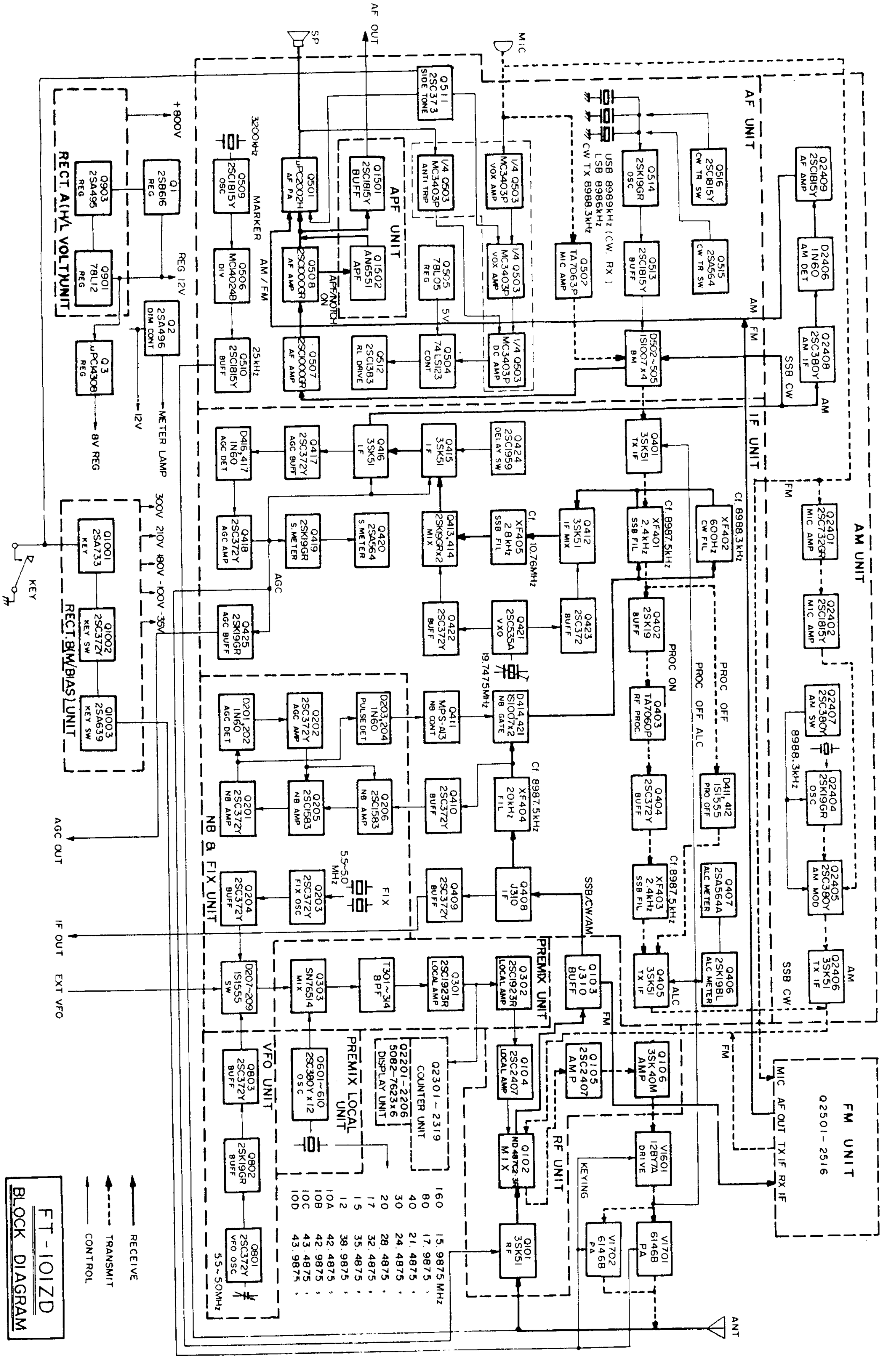
The accessory plug allows access to relay contacts and ALC voltage. The ACC plug must be inserted in the accessory socket for proper operation of the transceiver, whether or not external connections are being made.

(3) PHONO PLUG 2 pcs.

Use these plugs for interface with station equipment via the FT-101ZD rear panel.

(4) SPARE FUSES 5A (3A) 1 pc. each

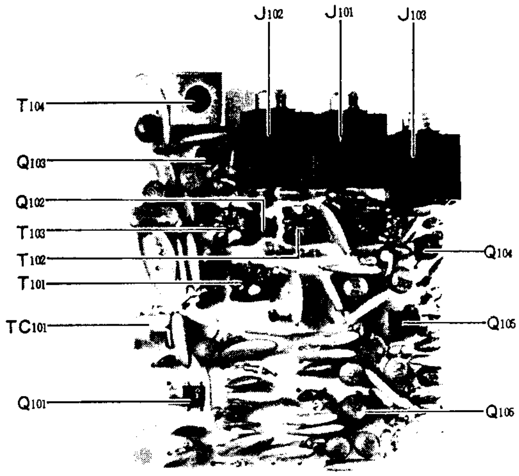
When replacing fuses, be absolutely certain to use a fuse of the proper rating. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY IMPROPER FUSE REPLACEMENT. For 100 - 117 volt AC operation, use a 5 amp fuse. For 200 - 234 volt operation, use a 3 amp fuse.


FT-101ZD
BLOCK DIAGRAM
RECEIVE
TRANSMIT
CONTROL
AF UNIT
AM UNIT
IF UNIT
APF UNIT
NB & FIX UNIT
PREMIX UNIT
PREMIX LOCAL UNIT
VFO UNIT
RF UNIT
FM UNIT
Q2501 - 2516
RECT. A(H/L VOLT)UNIT
RECT. B(M/BIAS) UNIT
Q2301 - 2319
COUNTER UNIT
Q2201 - 2206
5082-7623x6
DISPLAY UNIT
AF OUT
SP
MIC
KEY
ANT
AGC OUT
IF OUT
EXT VFO
METER LAMP
8V REG
REG 12V
+800V
300V
210V
180V
-100V
-35V
USB 8989kHz (CW. RX)
LSB 8986kHz
CW TX 8988.3kHz
PROC OFF
PROC ON
PROC OFF ALC
SSB/CW/AM
SSB CW
AM
FM
AGC
ALC
160 15.9875MHz
80 17.9875
40 21.4875
30 24.4875
20 28.4875
17 32.4875
15 35.4875
12 38.9875
10A 42.4875
10B 42.9875
10C 43.4875
10D 43.9875

## RECEIVER

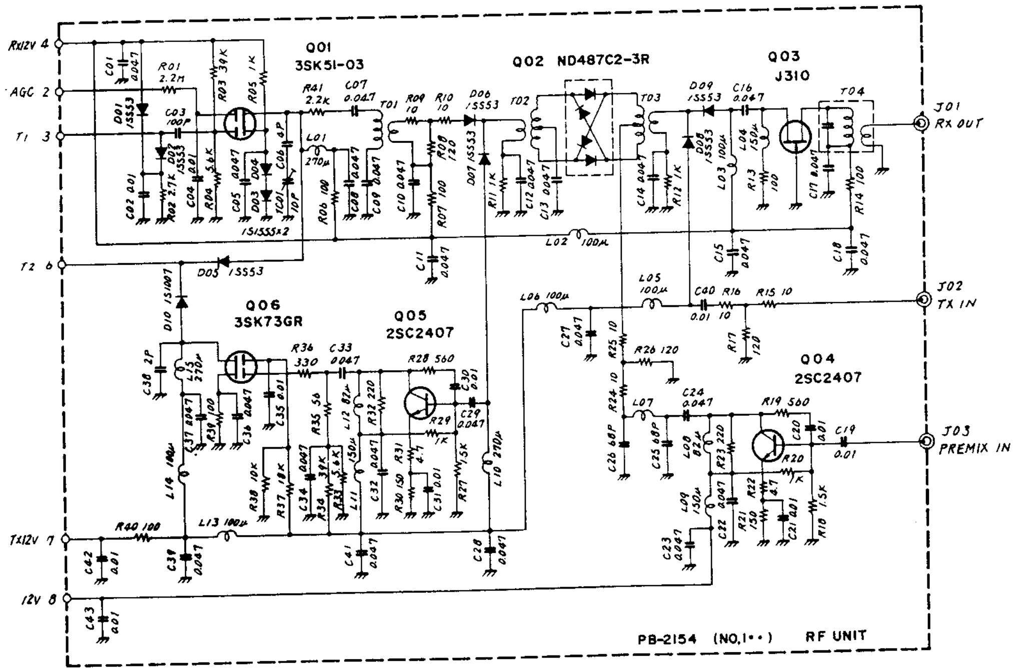
### RF UNIT (PB-2154)

The incoming signal is amplified by the RF amplifier, $Q_{101}$ (3SK51-03), a dual-gate MOS FET with excellent rejection of cross modulation and intermodulation. The amplified signal is fed to the Schottky barrier diode module, $Q_{102}$ (ND487C2-3R), where the RF signal is mixed with a local signal delivered from $Q_{104}$ (2SC2407), resulting in a first IF of 8.9875 MHz. The IF signal is then amplified by $Q_{103}$ (J310) and fed to $J_{101}$.




RF UNIT (PB-2154)





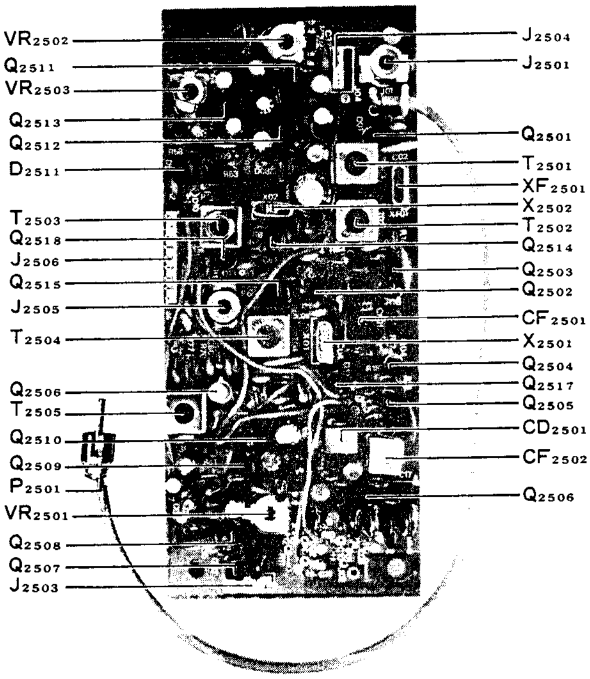
## FM UNIT (PB-2219) OPTION

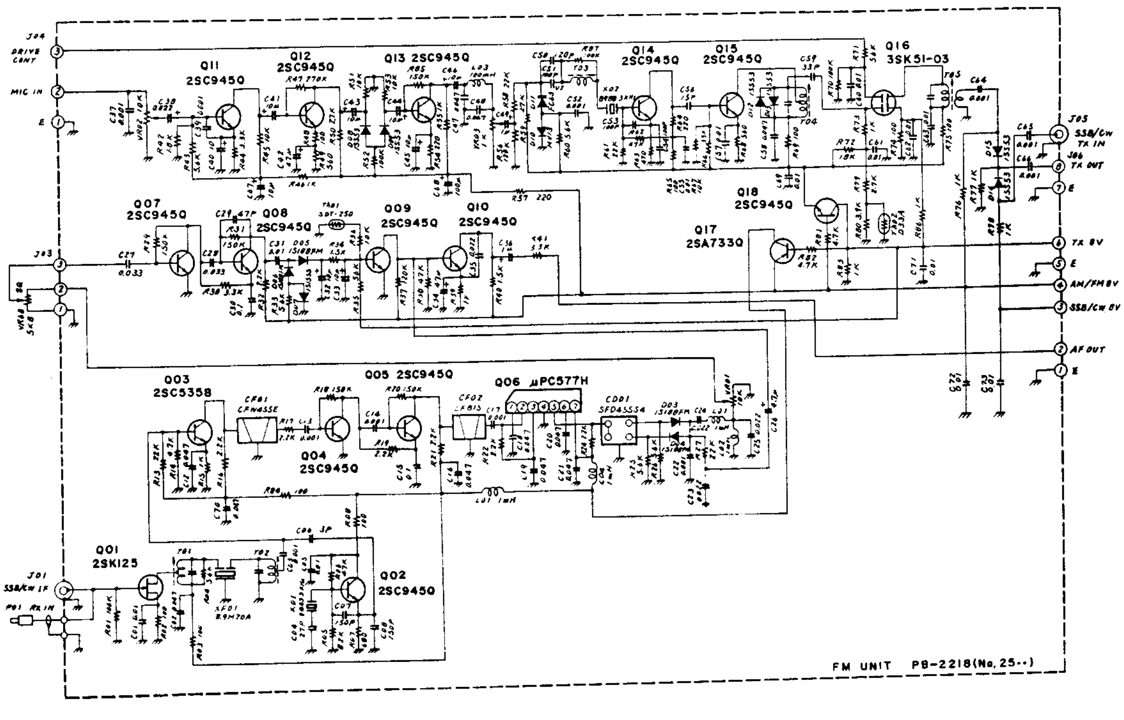
In the FM mode, the IF signal from the RF unit is fed to $Q_{2501}$ **(2SK125)**, where it is buffered and delivered through a 20 kHz band width monolytic filter, $XF_{2501}$ **(8.9M20A)** to a mixer, $Q_{2503}$ **(2SC-535B)**. The IF signal applied to $Q_{2503}$ is heterodyned with the 8532.5 kHz signal delivered from the local signal oscillator, $Q_{2502}$ **(2SC945Q)**, thus producing a 455 kHz IF signal. Next the 455 kHz IF signal passes through a ceramic filter, $CF_{2501}$ **(CFW455E)** and is amplified by a two-stage amplifier, $Q_{2504}$, $Q_{2505}$ **(2SC945Q)**, and then is fed through another ceramic filter, $CF_{2502}$ **(LFB15)** to an amplifier limiter, $Q_{2506}$ **($\mu$PC577H)**, where any amplified variations in the signal are removed.

A frequency discriminator consisting of $CD_{2501}$ **(SFD455S4)** and $D_{2503}$, $D_{2504}$ **(1S188FM)** produces an audio output in response to a corresponding frequency shift in the 455 kHz IF signal. The discriminator output is first delivered through a de-emphasis circuit consisting of $R_{2527}$, $R_{2528}$ and $C_{2523}$, and then sent to $Q_{2510}$ **(2SC945Q)**.

When no carrier is present in the 455 kHz IF, the noise at the discriminator output is amplified by $Q_{2507}$ and $Q_{2508}$, and detected by $D_{2505}$, $D_{2506}$ and $D_{2507}$ **(1S188FM)** to produce a DC voltage. This voltage is applied to turn "on" $Q_{2509}$ **(2SC-945Q)**. The thermistor, $TH_{2501}$ **(STD-250)** maintains the threshold level of the squelch control, corresponding to temperature changes.

While $Q_{2509}$ is "on", the base of $Q_{2510}$ **(2SC-945Q)** is grounded to quiet the audio amplifier. When a carrier is present the noise from the discriminator output is suppressed to turn "off" $Q_{2509}$, preventing normal action of $Q_{2510}$. The squelch control, $VR_{6b}$, sets the squelch threshold level.



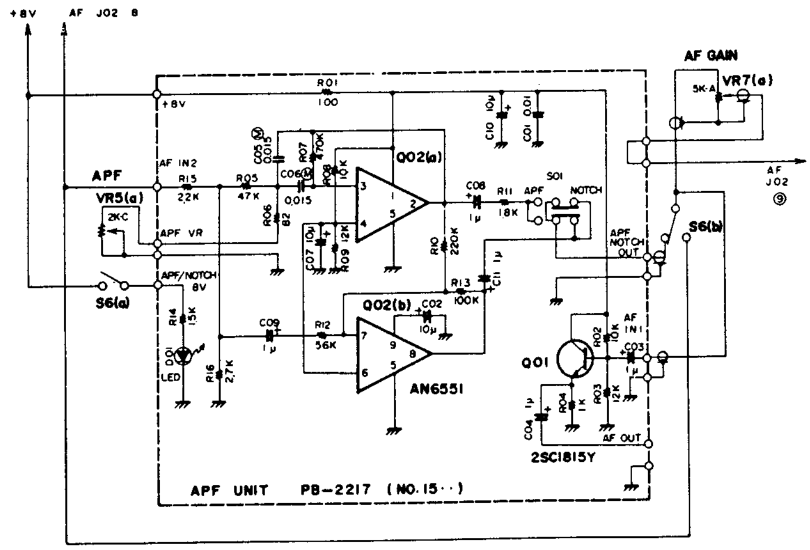
## APF UNIT (PB-2217)

The APF UNIT is placed in the audio circuit by the APF/NOTCH switch on the front panel. For APF operation, a selective active filter is formed by $Q_{1502}$(a), and the output is delivered to the AF UNIT through the AF GAIN control.

The sections of $Q_{1502}$(b),are also used for the high-Qnotch filter.APF VRprovides for adjustment of the center frequency of the audio peak and notch filter.

A portion of the audio signal at AF GAIN control is amplified by $Q_{1501}$ (2SC1815Y) to provide a fixed level audio signal to the AF OUT jack on the rear panel.






APF UNIT

## RF UNIT (PB-2154)

The IF signal from $J_{102}$ is delivered to the Schottky barrier diode module $Q_{102}$ (ND487C2-3R), where the IF signal is mixed with a local signal delivered from $Q_{104}$ (2SC2407), producing the RF output signal. The RF signal is then amplified by $Q_{105}$ (2SC2407) and $Q_{106}$ (3SK40M), and fed through diode switch $D_{110}$ (1S1007) to the DRIVE UNIT.

## FM MODE

The speech signal from the AF unit is fed through two stages of amplifier, consisting of $Q_{2511}$ and $Q_{2512}$ (2SC945Q), and this amplified signal is passed to the instantaneous deviation control (IDC) circuit, where both positive and negative peaks are clipped by $D_{2508}$ and $D_{2509}$ (1SS53). The output from the IDC is fed through $Q_{2513}$ (2SC945Q), where the signal is amplified and then fed to the de-emphasis circuit, consisting of $C_{2547}$, $C_{2548}$ and $L_{2503}$. This signal passes through $VR_{2503}$, where determines the maximum deviation, to the modulator $D_{2511}$ (FC63) while $Q_{2514}$ (2SC945Q) oscillates at a crystal frequency of 8988.3 kHz, and its frequency is modulated by variable capacitance diode $D_{2511}$. The output from $Q_{2514}$ is amplified by $Q_{2515}$ (2SC945) and $Q_{2516}$ (2SK51-03) and then fed through a diode switch $D_{2515}$ (1SS53) to pin 6 of $J_{2506}$. The output from the terminal is delivered to the IF unit.

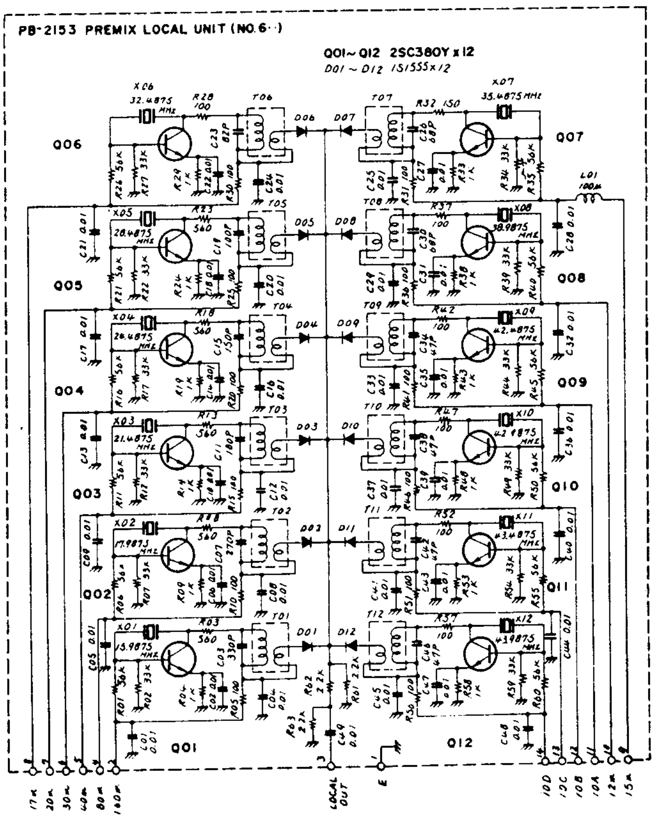
## PREMIX LOCAL UNIT (PB-2153)

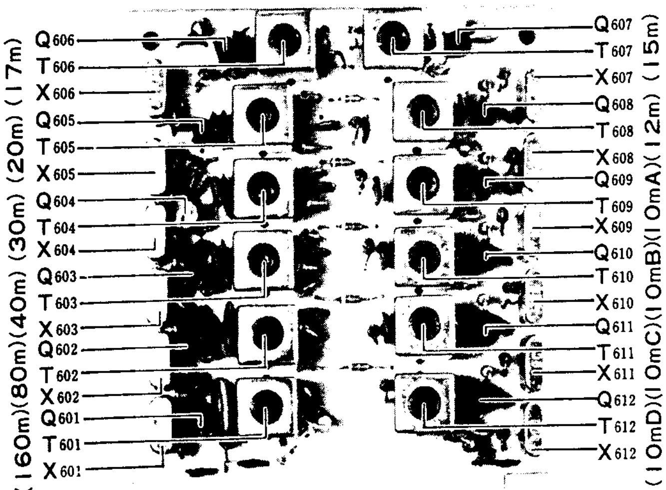
Crystal oscillators $Q_{601}$–$Q_{612}$ (2SC380Y) generate the premix local signal at the frequencies shown in Table 3. Diode switches $D_{601}$–$D_{612}$ (1S1555) select the proper local signal for the band in use. The local signal is then delivered to the PREMIX UNIT.

| | | XCO Frequency | PREMIX OUT Frequency |
|---|---|---|---|
| 160m | $X_{601}$ | 15.9875MHz | 10.4875~10.9875MHz |
| 80m | $X_{602}$ | 17.9875MHz | 12.4875~12.9875MHz |
| 40m | $X_{603}$ | 21.4875MHz | 15.9875~16.4875MHz |
| 30m | $X_{604}$ | 24.4875MHz | 18.9875~19.4875MHz |
| 20m | $X_{605}$ | 28.4875MHz | 22.9875~23.4875MHz |
| 17m | $X_{606}$ | 32.4875MHz | 26.9875~27.4875MHz |
| 15m | $X_{607}$ | 35.4875MHz | 29.9875~30.4875MHz |
| 12m | $X_{608}$ | 38.9875MHz | 33.4875~33.9875MHz |
| 10m A | $X_{609}$ | 42.4875MHz | 36.9875~37.4875MHz |
| 10m B | $X_{610}$ | 42.9875MHz | 37.4875~37.9875MHz |
| 10m C | $X_{611}$ | 43.4875MHz | 37.9875~38.4875MHz |
| 10m D | $X_{612}$ | 43.9875MHz | 38.4875~38.9875MHz |

Table 3



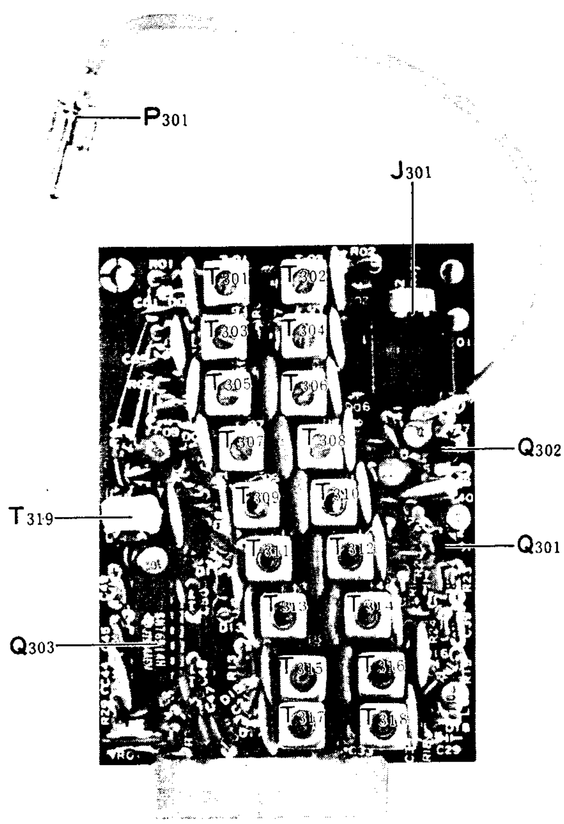


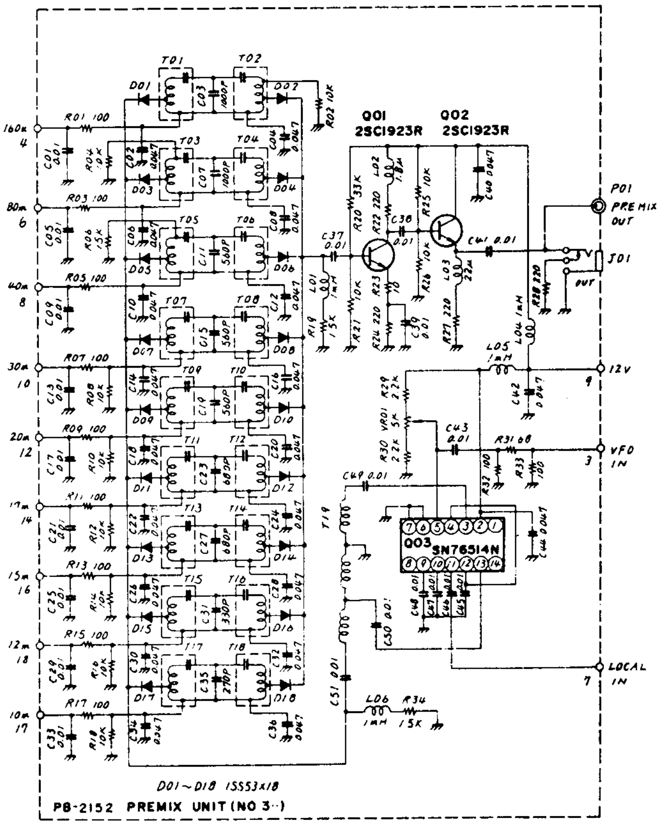

PREMIX LOCAL (XTAL) UNIT (PB-2153)

## PREMIX UNIT (PB-2152)

The premix signal is produced at $Q_{303}$ (SN76514N), a double-balanced mixer, where the premix local signal from $Q_{601}$–$Q_{612}$ is mixed with the VFO or crystal controlled 5 MHz signal. The premix output frequencies are shown in Table 3. The premix signal is passed through bandpass filter $T_{301}$–$T_{318}$, and amplified by $Q_{301}$, $Q_{302}$ (2SC1923R). The amplified signal is then fed to the RF UNIT, where the signal is further amplified by $Q_{102}$ for delivery to the transmitter and receiver mixers.




PREMIX UNIT (PB-2152)



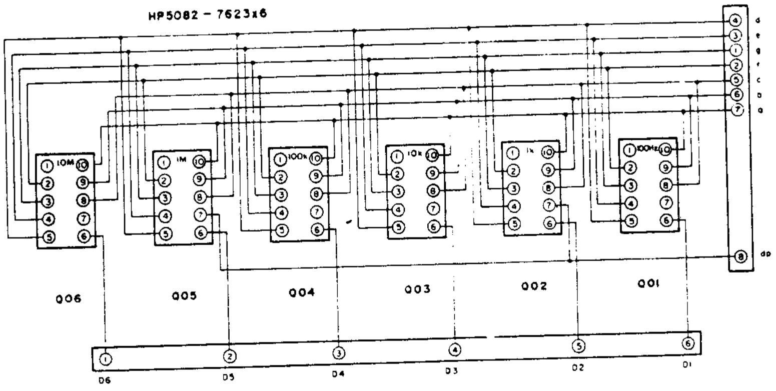

| | Nominal Premix Local Frequency | L S B | U S B | CW, AM/FM |
|---|---|---|---|---|
| 160m | 10.4875–10.9875(MHz) | 10.486–10.986(MHz) | 10.489–10.989(MHz) | 10.4883–12.9883(MHz) |
| 80m | 12.4875–12.9875 | 12.486–12.986 | 12.489–12.989 | 12.4883–12.9883 |
| 40m | 15.9875–16.4875 | 15.986–16.486 | 15.989–16.489 | 15.9883–16.4883 |
| 30m | 18.9875–19.4875 | 18.986–19.486 | 18.989–19.489 | 18.9883–19.4883 |
| 20m | 22.9875–23.4875 | 22.986–23.486 | 22.989–23.489 | 22.9883–23.4883 |
| 17m | 26.9875–27.4875 | 26.986–27.486 | 26.989–27.489 | 26.9883–27.4883 |
| 15m | 29.9875–30.4875 | 29.986–30.486 | 29.989–30.489 | 29.9883–30.4883 |
| 12m | 33.4875–33.9875 | 33.486–33.986 | 33.489–33.989 | 33.4883–33.9883 |
| 10m A | 36.9875–37.4875 | 36.986–37.486 | 36.989–37.489 | 36.9883–37.4883 |
| 10m B | 37.4875–37.9875 | 37.486–37.986 | 37.489–37.989 | 37.4883–37.9883 |
| 10m C | 37.9875–38.4875 | 37.986–38.486 | 37.989–38.489 | 37.9883–38.4883 |
| 10m D | 38.4875–38.9875 | 38.486–38.986 | 38.489–38.989 | 38.4883–38.9883 |

## COUNTER UNIT (PB-2086A-3420/PB-2098)

The local oscillator signal is applied to Large-Scale Integrated Circuit (LSI) chip for display on the front panel digital display.

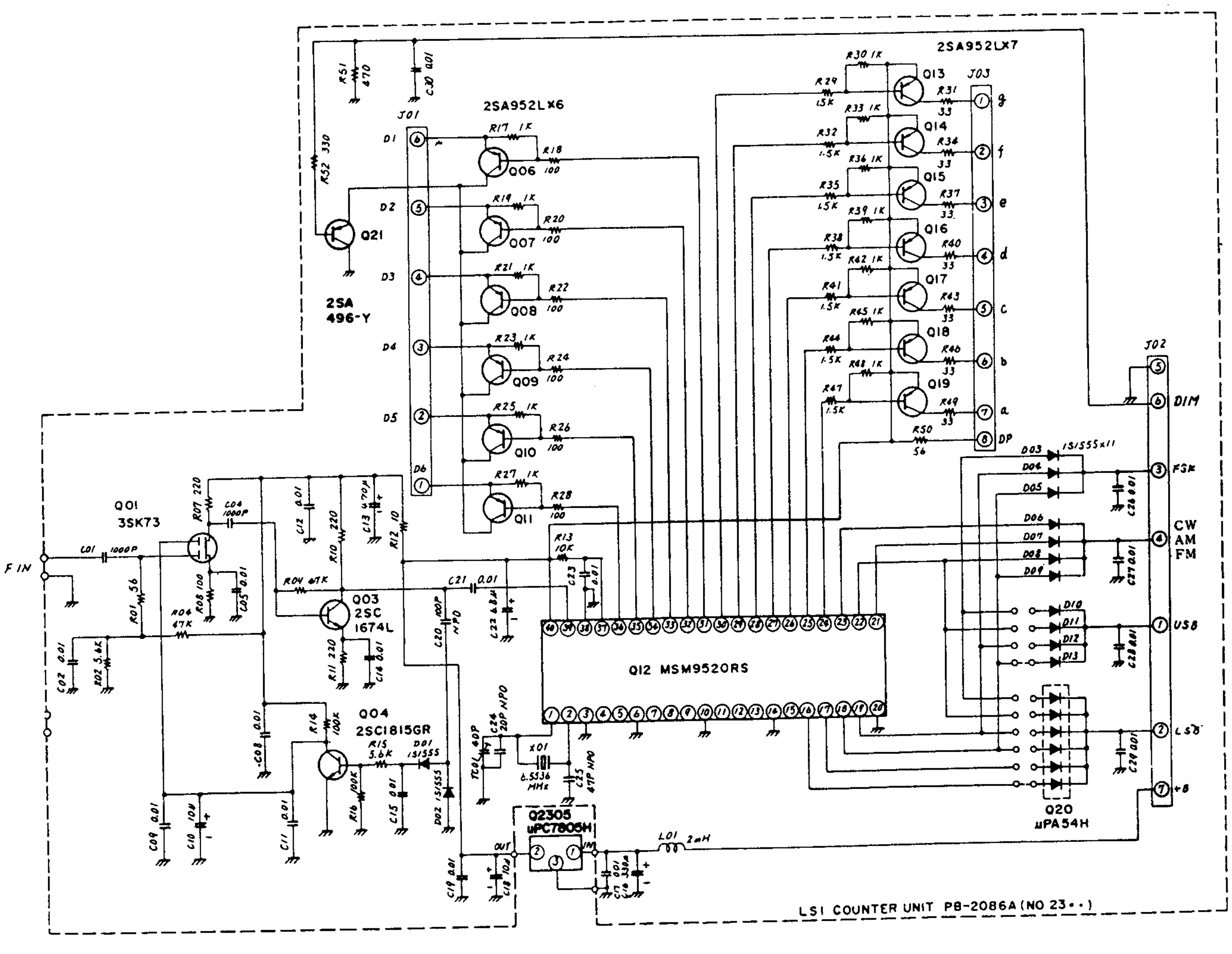
The premix signal as shown in Table 4 from the LOCAL unit, is amplified by $Q_{2301}$ (3SK73). The amplified signal is further amplified by $Q_{2303}$ (2SC1674) and delivered to the LSI counter chip, $Q_{2312}$ (MSM9520RS). A portion of the output from $Q_{2303}$ is amplified by $Q_{2304}$ (2SC1815Y) and fed to gate 2 of $Q_{2301}$ controlling the gain of this amplifier.

The output from the LSI is fed to the display. The output from pins 24 through 30 is delivered to segment drivers $Q_{2313}$–$Q_{2319}$ (2SA952L) and digit drivers $Q_{2306}$–$Q_{2311}$ (2SA952L) through a dynamic drive configuration. Display is performed by $D_{2201}$–$D_{2206}$ (HP5082-7623), seven-segment light-emitting diodes.

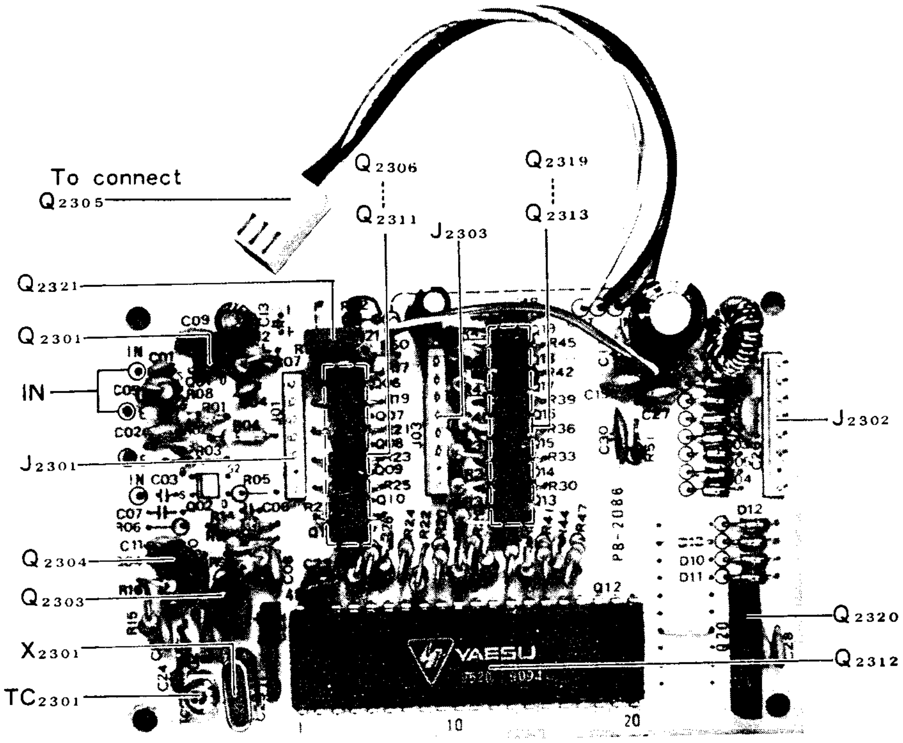



DISPLAY UNIT PB-2098

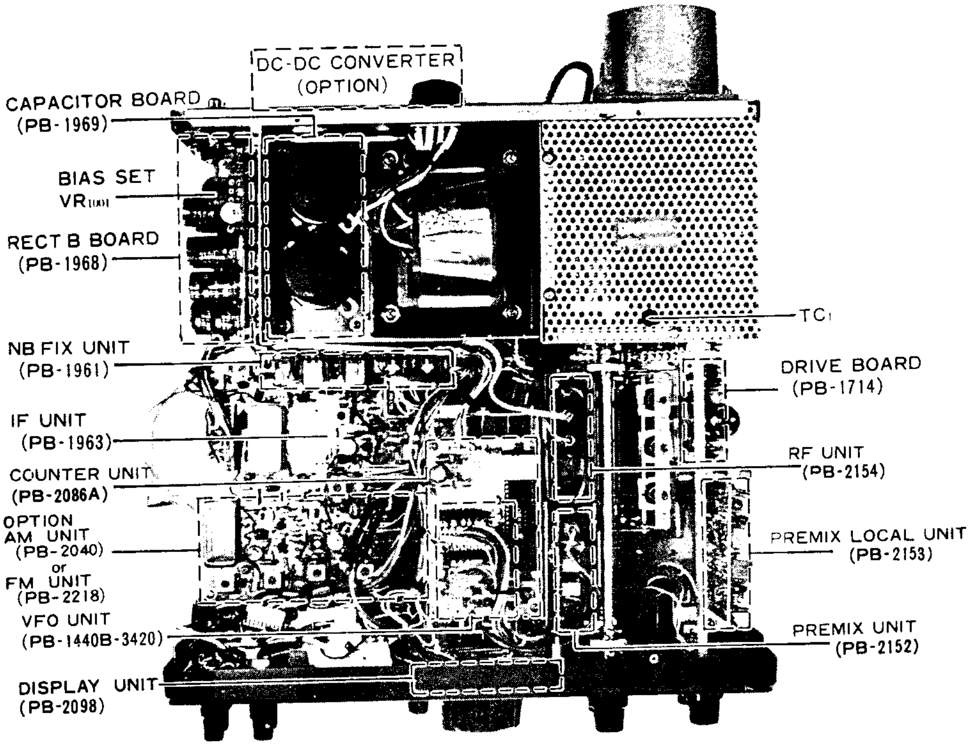





DISPLAY/COUNTER UNIT

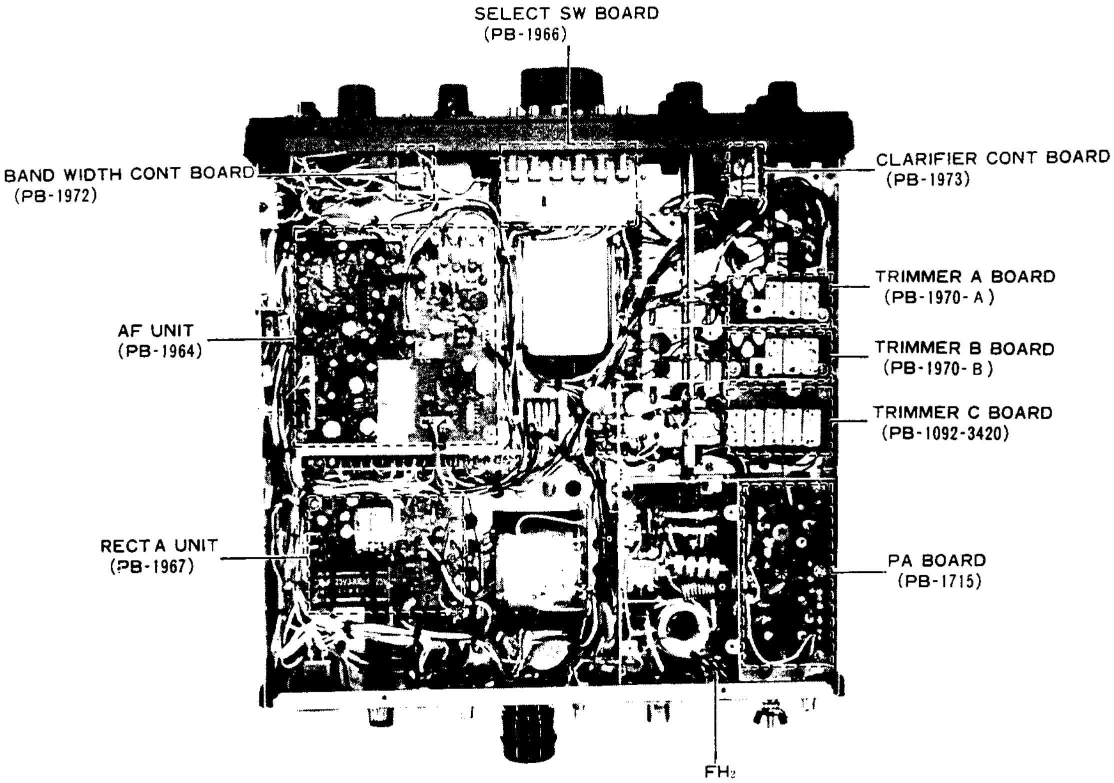



COUNTER UNIT (PB-2086A)




TOP VIEW






BOTTOM VIEW

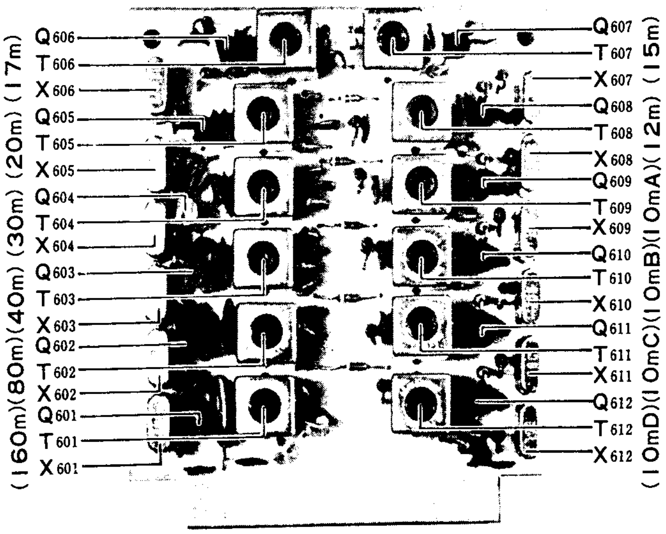
## PREMIX LOCAL UNIT

### Premix Local Alignment

1. Connect the RF probe of the VTVM to pin 3 of $MJ_3$.
2. Refer to Table 6 , and adjust the appropriate transformer for a level of 300 mV for each band and crystal, as shown in the table.

| BAND | CRYSTAL | FREQUENCY | TRANS FORMER |
|---|---|---|---|
| 160m | $X_{601}$ | 15.9875MHz | $T_{601}$ |
| 80m | $X_{602}$ | 17.9875 | $T_{602}$ |
| 40m | $X_{603}$ | 21.4875 | $T_{603}$ |
| 30m | $X_{604}$ | 24.4875 | $T_{604}$ |
| 20m | $X_{605}$ | 28.4875 | $T_{605}$ |
| 17m | $X_{606}$ | 32.4875 | $T_{606}$ |
| 15m | $X_{607}$ | 35.4875 | $T_{607}$ |
| 12m | $X_{608}$ | 38.9875 | $T_{608}$ |
| 10m A | $X_{609}$ | 42.4875 | $T_{609}$ |
| 10m B | $X_{610}$ | 42.9875 | $T_{610}$ |
| 10m C | $X_{611}$ | 43.4875 | $T_{611}$ |
| 10m D | $X_{612}$ | 43.9875 | $T_{612}$ |

Table 6.




PREMIX LOCAL (XTAL) UNIT (PB-2153)

## PREMIX UNIT

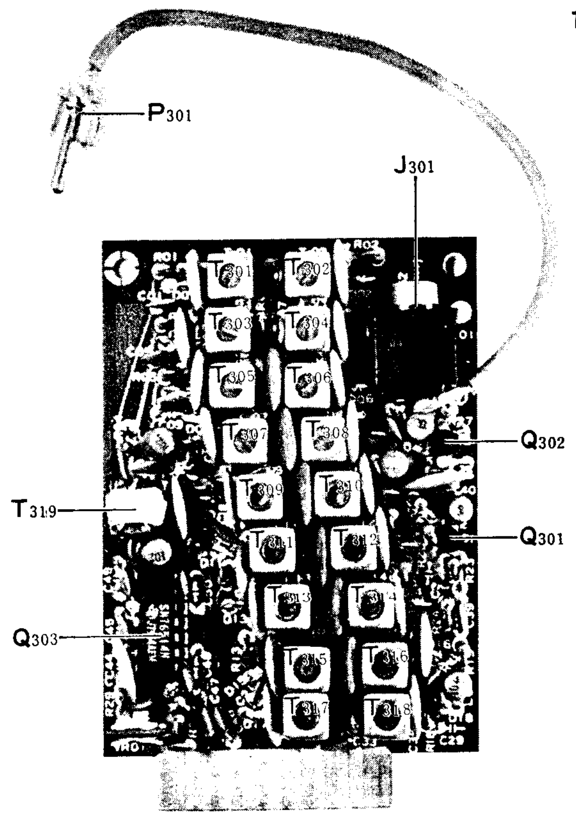
For this alignment, a wideband (not peak) sweep generator, as well as an oscilloscope, should be used.

1. Press the EXT select switch. Apply 5.0 - 5.5 MHz sweep output to the VFO output terminal at the rear apron external VFO jack. Connect a high-impedance probe of an oscilloscope to $J_{301}$.
2. Adjust the transformers shown in Table 7 for a flat response across the entire passband. If you have never adjusted a bandpass filter previously, this may take some practice. Perform the adjustments on each band, according to the chart.

| BAND | TRANS-FORMER | PASSBAND |
|---|---|---|
| 160m | $T_{301}$, $T_{302}$ | 10.4—11.0(MHz) |
| 80m | $T_{303}$, $T_{304}$ | 12.4—13.0 |
| 40m | $T_{305}$, $T_{306}$ | 15.9—16.5 |
| 30m | $T_{307}$, $T_{308}$ | 18.9—19.5 |
| 20m | $T_{309}$, $T_{310}$ | 22.9—23.5 |
| 17m | $T_{311}$, $T_{312}$ | 26.9—27.5 |
| 15m | $T_{313}$, $T_{314}$ | 29.9—30.5 |
| 12m | $T_{315}$, $T_{316}$ | 33.5—34.0 |
| 10m | $T_{317}$, $T_{318}$ | 36.9—39.0 |

**Table 7**






PREMIX UNIT (PB-2152)

## FM UNIT

Set the transceiver to operate at 29.0 MHz (10 mC).

### RX IF Adjustment

Turn the SQL control fully counterclockwise, and adjust $T_{2501}$ and $T_{2502}$ for maximum receiver noise from the speaker, with no signal applied to the ANT connector.

### Squelch Threshold Adjustment

Set the SQL control at the 10 o'clock position, and adjust $VR_{2501}$ to the point where the receiver noise just disappears.

### Carrier Frequency Adjustment

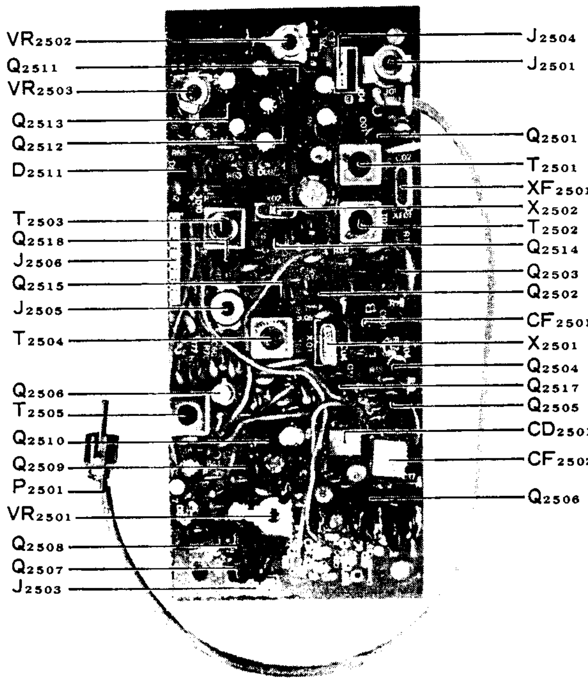
Connect a frequency counter to pin 8 of $J_{2501}$, and set the MIC GAIN control fully counterclockwise.

Adjust $T_{2501}$ for a reading of exactly 8988.3 kHz.

### TX IF Adjustment

Connect the probe of a VTVM to pin 8 of $J_{2506}$, and adjust $T_{2504}$ and $T_{2505}$ for a maximum reading on the VTVM. While this adjustment is being made, the DRIVE control should be adjusted so as not to clip the signal in the IF stage. If the DRIVE control is set too excessively high, the peak cannot be accurately obtained.

It may be necessary to perform this adjustment a few times in order to obtain a definite reading.




### Deviation Adjustment

Connect a deviation meter to the antenna jack, and connect an audio signal generator to the microphone input terminal, as shown in Figure 17.

Set the MIC GAIN control fully clockwise, and set $VR_{2502}$ at the 9 o'clock position. Apply a 1 kHz, 15 mV signal to the microphone terminal, and adjust $VR_{2503}$ for a deviation of ±4.5 kHz, as shown on the deviation meter.

Set the MIC GAIN control at the 2 o'clock position, and reduce the output of the signal generator to 2 mV. Now adjust $VR_{2502}$ for a deviation of ±3.5 kHz on the deviation meter.

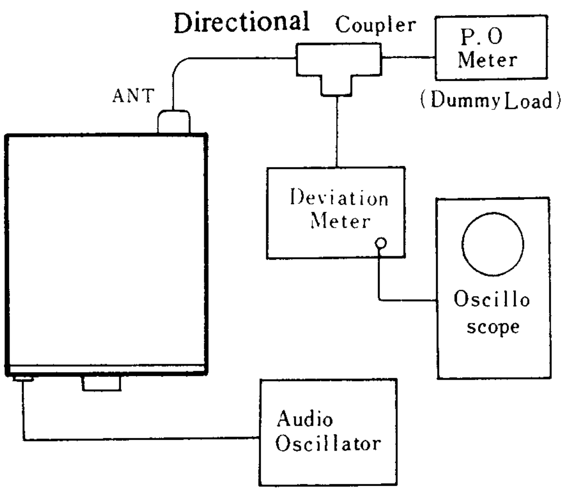
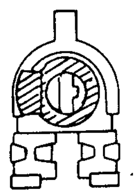



Figure 17



$VR_{2502}$ at the 9 o'clock position.

# OPTIONAL INSTALLATIONS

## FT-101ZD DC-DC CONVERTER INSTALLATION

The optional DC-DC converter can be installed in a matter of minutes. Please follow the instructions carefully, in order to make the proper connections.

### INSTALLATION

(1) Remove the seal covering the chassis cutout for the DC-DC converter installation on the rear panel, and install the 9 pin connector supplied with the kit on the chassis cutout, as shown in Figure 5.

(2) Remove the nylon clamp binding the 7 wires, and slip off the vinyl tube from the wires. Then, insert each of the wires (except the orange wire) into the short transparent vinyl tube supplied with the kit, for insulation.

(3) Solder the 7 wires to the appropriate pins of the connector, as shown in Figure 6.

(4) Install the DC-DC converter module as shown in Figure 8. Use the four screws supplied with the kit. Do not force the plug into the socket, as the connection should be smooth, yet solid.

(5) Check the DC cable fuse socket, located in the positive (red) lead, to be certain that a 20 amp fuse is installed.

(6) When making connections to the battery, be absolutely certain that the proper polarity is observed. The RED lead should be connected to the POSITIVE (+) battery terminal, and the BLACK lead should be connected to the NEGATIVE (–) terminal. OUR WARRANTY DOES NOT COVER DAMAGE CAUSED BY REVERSED POLARITY CONNECTIONS.

(7) Before connecting the DC power cable to the transceiver, check the automobile voltage regulator level with the engine running (battery charging). The maximum charging rate should be 15 volts or less. If the voltage is higher than this level, please adjust the voltage regulator for a maximum of 15 volts. This precaution also applies to bench power supplies, which should be adjusted in the same fashion. Caution should also be taken so that the transceiver is not operated from a supply voltage of less than 12 volts.

(8) Connect the DC cable to the transceiver. Power connections are made automatically when the DC cable is connected to the POWER jack.

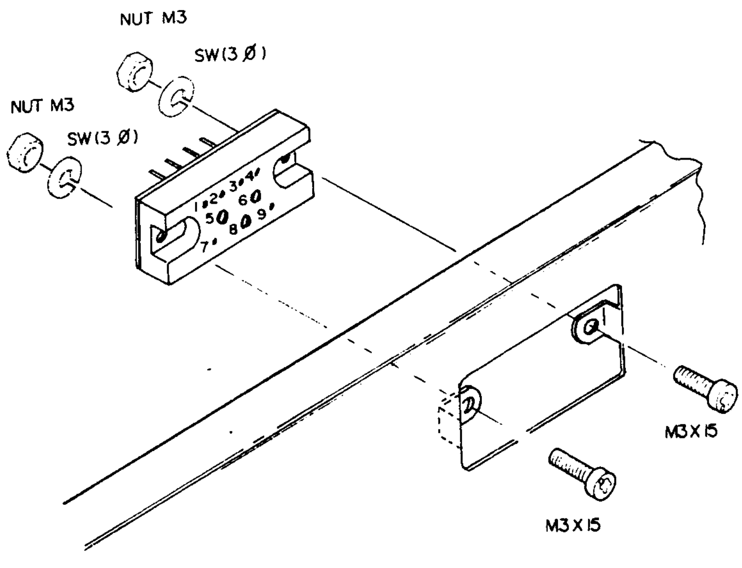



Figure 5

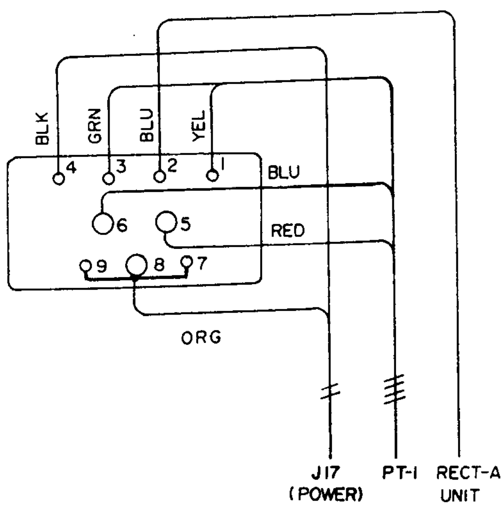



Figure 6

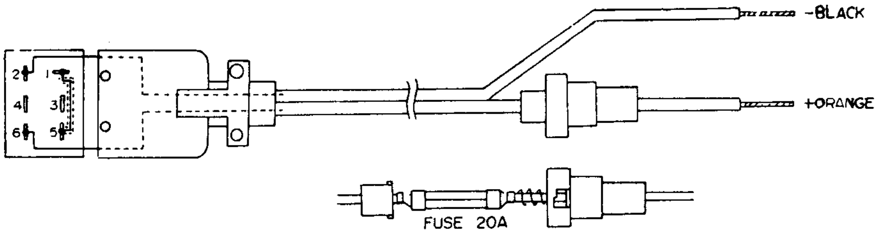



Figure 7



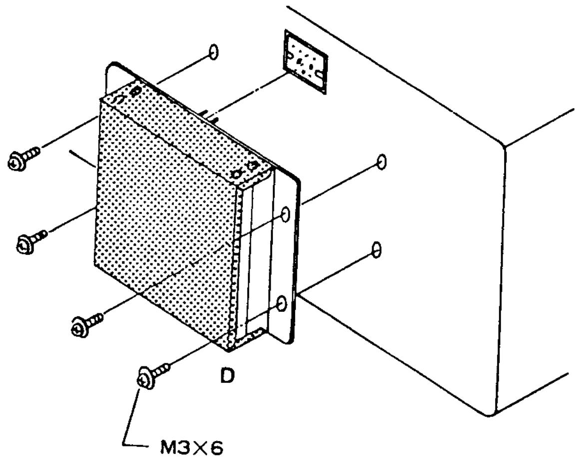



Figure 8

## COUNTER UNIT (PB-2086A) INSTALLATION ON FT-101Z

The installation of the New Counter unit (PB-2086A) to the FT-101Z economy can be easily accomplished in a matter of minutes.

Counter units PB-1980 and PB-1980B cannot be installed in FT-101Z's with serial number above XX160001.

PARTS NEEDED

| | |
|---|---|
| Optical Filter with double-face tape | (1) |
| Counter Module | (1) |
| Guide Pins | (2) |
| Support Tower | (1) |
| Vinyl Tubes | (2) |

(1) Remove the top cover of the transceiver, according to the drawing on page 3-5.

(2) Remove the screws marked "A" in Figure10 These screws support the LED board.

(3) Remove the screws marked "B" in Figure10, as well as the tension spring, and remove the analog display panel.

(4) Locate the analog display lamp. Cut the leads to this lamp, insert 1 lead each into the vinyl tube supplied with the counter kit, and position these leads out of the way of the VFO gears, etc.

(5) Install the orange optical filter on the inside of the front panel of the transceiver, in the position formerly occupied by the analog display panel. Be sure that it is correctly centered. The filter is held in place by the double-face tape included with the filter.

(6) Replace the LED board with "A" screws. Install the support tower into the hole marked "C" in Fig. 10.

(7) Install the Counter unit with the screw previously installed at "B" for securing the counter module at point "C". Use the two plastic screws supplied with the kit for securing at point "B". Connect the Molex plug into the board connector J2302 on the Counter unit (if your transceiver bears a serial number smaller than XX159999, use the supplied connector assembly for this connection). The coaxial cable from the Counter unit is connected to point "F" in Fig. 10.

(8) Remove the 820 ohm (Gray-Red-Brown) resistor from the terminal strip marked "E" in Figures 10 and 11.

(9) Close the transceiver. No alignment of the unit is necessary.

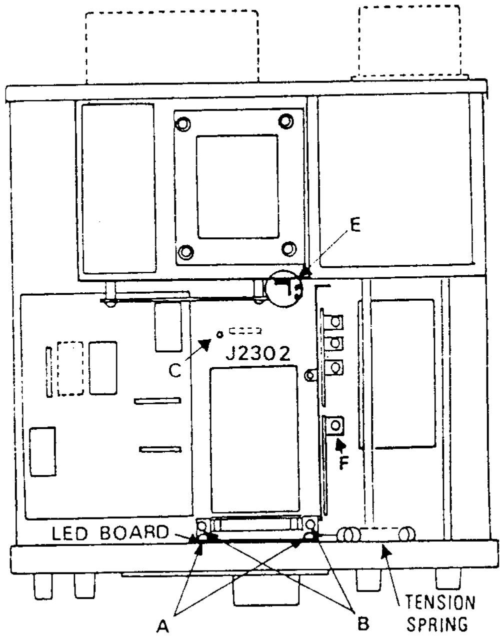



Figure 10

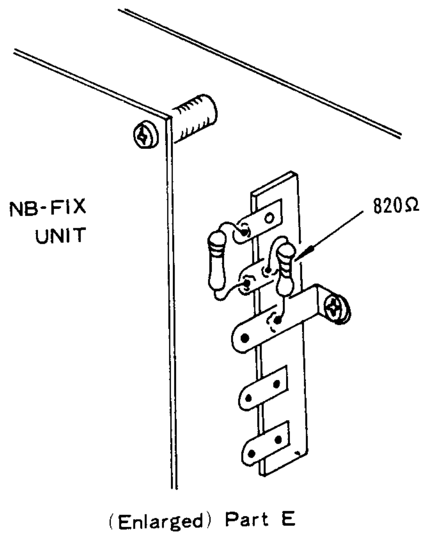



Figure 11

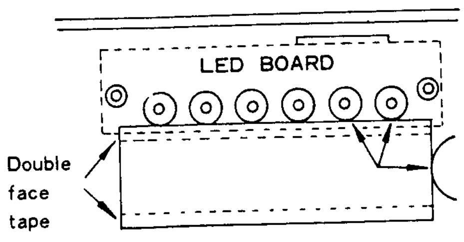



Figure 12

## FM UNIT INSTALLATION

1. Remove the top cover of the transceiver, as shown in Figure 1 on page 3-5.
2. Remove the two screws (shown as "C" on Figure 13) from the IF unit, and replace with the two post screws supplied.
3. Install the FM unit in the space over the IF unit, and secure it with the mounting screws previously removed from the IF unit.
4. Connect $P_{19}$ (3 pin) to $J_{2504}$; $P_{32}$ (3 pin) to $J_{2503}$; and $P_{20}$ (8 pin) to $J_{2506}$. During this procedure, be sure not to press to heavily on the connector, so as not to damage the unit.
5. Unplug $P_{14}$ (yellow shielded cable) from $J_{101}$ on the RF unit, and connect it to $J_{101}$ on the FM unit. Then connect $P_{2501}$ (yellow shielded cable) to $J_{101}$, by referring to Figure 15.
6. On the RF unit, unplug $P_{11}$ (red shielded cable) from $J_{102}$, and connect it to $J_{2505}$ on the FM unit. Connect $P_{22}$ (red shielded cable) from $P_{20}$ (connected to $J_{2506}$) on the FM unit, to $J_{102}$ on the RF unit, as shown in Figure 15.



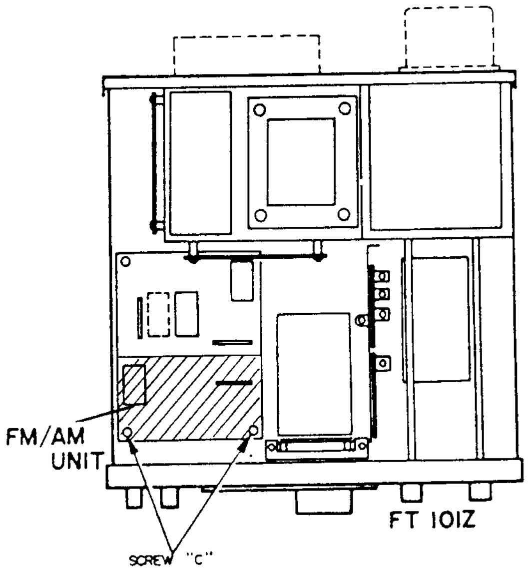



Figure 13

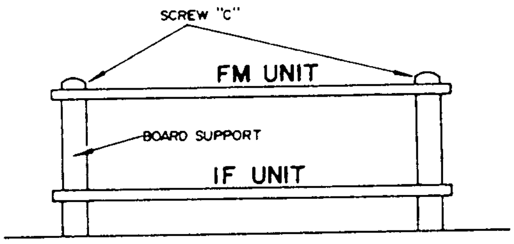



Figure 14

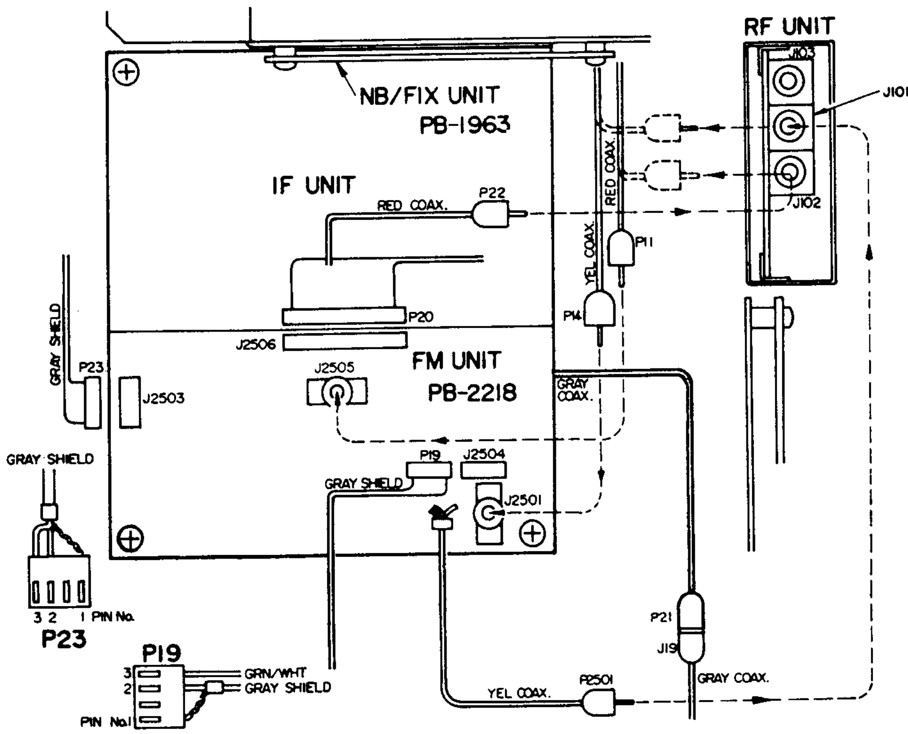



Figure 15

## AM UNIT INSTALLATION

(1) Remove the top cover of the transceiver, as shown in Figure 1 on page 3-5.

(2) Refer to Figure 13, and remove the mounting screws marked "C" on the IF unit.

(3) Refer to Figures 13 and 14, and install the AM unit atop the IF unit, using the mounting towers and screws supplied.

(4) Unplug P21 from J19, as shown in Figure 16, and reconnect P21 to J2401. Connect P2401 from the AM unit to J19.

(5) Locate the 3-pin and 8-pin Molex connectors ir the vicinity of the IF unit. Loosen their cables, as necessary, from the harness restraints, in order to make the following connections. The 8-pin connector P20 connects to J2403; the 3-pin P19 connects to J2402; RCA plug P22 (from P20) connects to J102 on the RF unit (remove P11 from J102, and very carefully insert it into J2404 on the AM unit).

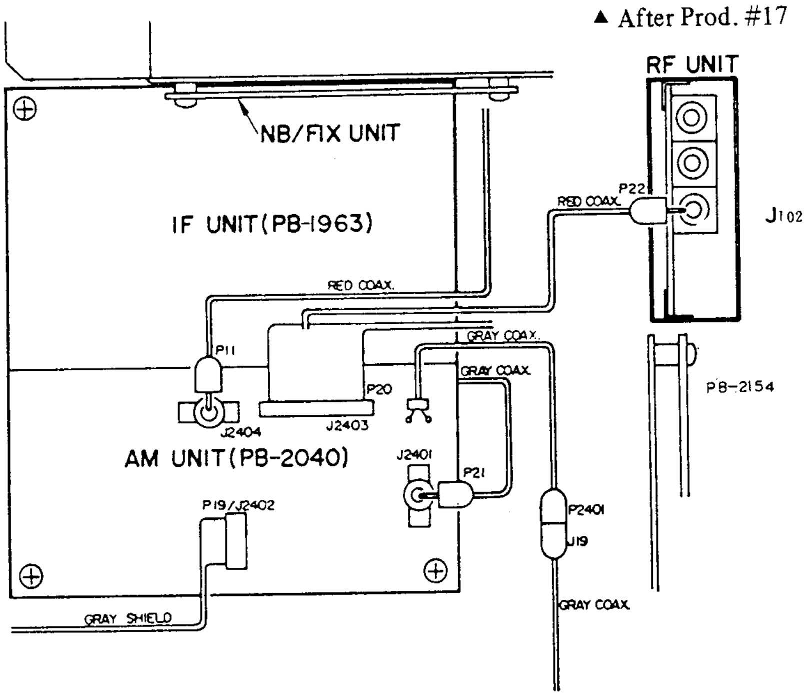
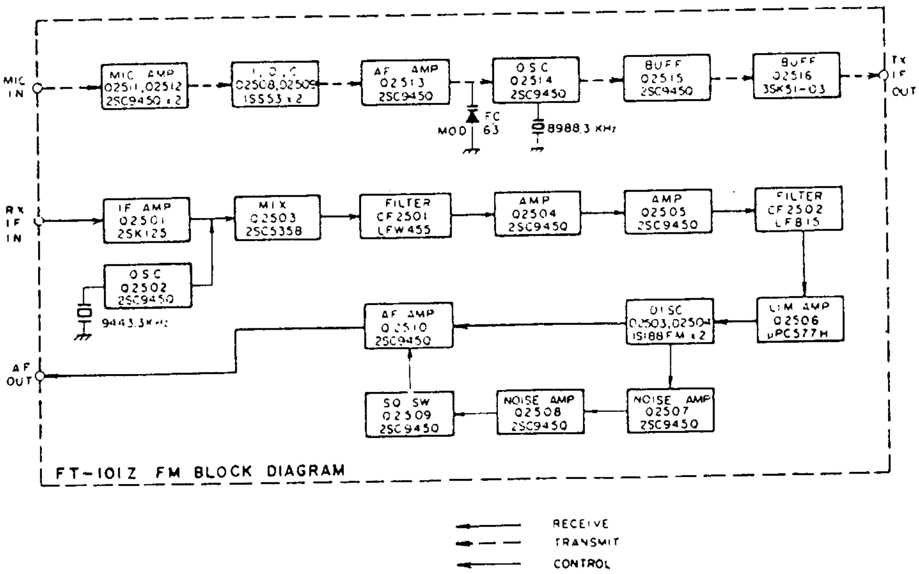



Figure 16



## MAIN CHASSIS

| Symbol No. | Part No. | Description |
|---|---|---|
| | | **IC, TRANSISTOR** |
| Q2 | G3104960Y | TR 2SA496(Y) |
| Q1 | G3206160R | ″ 2SB616R(S) |
| Q4 | G3408800 | ″ 2SD880(O) |
| Q3 | G1090070 | IC μPC14308 |
| | G1090080 | ″ μPC78L08 |
| | | |
| | | |
| | | |
| | | **DIODE** |
| D1 | G2090029 | Ge 1N60 |
| D2–5, 10–14 | G2015550 | Si 1S1555 |
| D6 | G2090001 | ″ 10D1 |
| | | |
| | | |
| | | |
| | | **RESISTOR** |
| R22, 24 | J01245220 | Carbon film 1/4W TJ 22 Ω |
| R23 | J01245330 | ″ ″ ″ ″ 33 Ω |
| R14 | J01245560 | ″ ″ ″ ″ 56 Ω |
| R7, 11 | J01245101 | ″ ″ ″ ″ 100 Ω |
| R18, 26 | J01245821 | ″ ″ ″ ″ 820 Ω |
| R4, 5 | J01245102 | ″ ″ ″ ″ 1 kΩ |
| R6, 19 | J01245152 | ″ ″ ″ ″ 1.5 kΩ |
| | J01245182 | ″ ″ ″ ″ 1.8 kΩ |
| R17 | J01245222 | ″ ″ ″ ″ 2.2 kΩ |
| R20 | J01245474 | ″ ″ ″ ″ 470 kΩ |
| R2 | J10276100 | Carbon composition 1/2W GK 10 Ω |
| R9, 10 (with L5, L6) | – | ″ ″ 1W ″ 56 Ω |
| R3 | J10276101 | ″ ″ ″ ″ 100 Ω |
| R1, 8 | J10276222 | ″ ″ ″ ″ 2.2 kΩ |
| R25 | J30356150 | Cement 3W 15 Ω |
| | | |
| | | |
| | | |
| | | **POTENTIOMETER** |
| VR1 | J60800078 | VM11AX46E 5M1112 10 kΩB |
| VR2 | J62800053 | K16BA004C 500 kΩB/20 kΩB |
| VR3 | J62800052 | K16BA004C 5 kΩA/5 k B |
| VR4 | J60800079 | K1611000HE 5 kΩA |
| VR5 | J62800056 | K16BA1A05 5 kΩB/2 k C |
| VR6 | J62800054 | EVHCOAS15B23 5 kΩB x 2 |
| VR7 | J62800055 | EVHCOAS15B24 5 kΩB/5 k A |
| VR8 | J60800037 | VM10A654A 1 kΩB |
| VR9, 10 | J60800038 | VM10A654A 5 kΩB |
| VR11 | J60800077 | K1611000AZE 5 kΩB |
| | | |
| | | |
| | | |
| | | **CAPACITOR** |
| | | Dipped mica 500 WV 5 pF |
| C13, 19, 21 | K30276271 | ″ ″ ″ 270 pF (LCQ17271K5) |
| C8 | K30276331 | ″ ″ 500 WV 330 pF (LCQ17331K5) |
| C7 | K30276621 | ″ ″ 500 WV 620 pF (LCQ18621K5) |

| Symbol No. | Part No. | Description |
|---|---|---|
| C6 | K30279052 | Dipped mica 500 WV 1100 pF (DM19D-112K5) |
| C5 | K30279062 | ″ ″ 500 WV 3000 pF (DM19D-302K5) |
| C59, 66 | K31306800 | Moulded mica 1 KWV 80 pF |
| C17 | K02279001 | Ceramic 500 WV 1 pF |
| C10 | K02279002 | ″ ″ 5 pF |
| C18 | K02279003 | ″ ″ 47 pF |
| C11 | K00279001 | ″ ″ 200 pF |
| C20 | K00279002 | ″ ″ 470 pF |
| C16 | K00359003 | ″ 1 KV 3 pF |
| C15 | K02309002 | ″ ″ 5 pF |
| C14 | K02309003 | ″ ″ 100 pF |
| C3 | K00329002 | ″ 1.5 KWV 460 pF |
| C9 | K00359001 | ″ 3 KV 100 pF |
| C1 | K12359001 | ″ ″ 1000 pF |
| C74, 75 | K13170102 | ″ 50 WV 0.001 μF |
| C29,34,35,41, 73,76–81 | K13170103 | ″ ″ 0.01 μF |
| C12, 22–24, 39,40,56,58, 60,68,69,82, 84 | K13170473 | ″ ″ 0.047 μF |
| C27, 28, 36 | K12279004 | ″ 500 WV 0.0047 μF |
| C54, 55, 61 | K12279002 | ″ ″ 0.01 μF |
| C2, 25, 26 | K12329002 | ″ 1.4 KV 0.0047 μF |
| C37, 64 | K12329001 | ″ ″ 0.01 μF |
| C42–51 | K21270002 | Feed thru 500 WV 0.001 μF (ECK-L2H102PE) |
| C63 | K40120476 | Electrolytic 16 WV 47 μF |
| C72 | K40120107 | ″ 50 WV 100 μF |
| C65 | K40120337 | ″ ″ 330 μF |
| C70 | K40120106 | ″ ″ 10 μF |
| C67 | K40109011 | ″ 10 WV 33 μF |
| | K50177104 | Mylar 50 WV 0.1 μF |
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| | | **VARIABLE CAPACITOR** |
| VC1 | K90000026 | YB-250 250 pF |
| VC2 | K90000016 | C134E125 |
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| | | **TRIMMER CAPACITOR** |
| TC1 | K91000007 | TSN120C 10P x 2 |
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| | | **INDUCTOR** |
| L1 | L0020534C | |
| L2 | L0020611B | |
| L3 | L1020690 | |
| L4 | L1020064 | |
| L5, L6 (R9, R10) | L1020308B | |
| L7 | L1190001 | EL0710-251K 250 μH |
| L8 | L1190017 | FL-5H-102K 1 mH |
| L9 | L0020705 | |

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|---|---|---|---|---|---|
| | | TRANSFORMER | J19 | P1090111 | J-7015 |
| T1 | L0020544A | | J20 | P1090152 | D8-703B-11 |
| T2, T3 | L0020074 | | | | |
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| | | | | | |
| | | | | | MULTI JACK |
| | | METER | MJ1 | P4090001 | 121S-10B-105A |
| M1 | M0090002 | Y-45-02 | MJ2 | P4090007 | 220D-20B-205A |
| | | | MJ3 | P4090002 | 121S-14B-105A |
| | | | | | |
| | | | | | |
| | | SPEAKER | | | |
| SP1 | M4090024 | SE-92B 4 Ω 3 W | | | PLUG |
| | | | P1 | P1090079 | 5047-12A (with wire T9201410C) |
| | | | P2 | P1090080 | 5047-13A ( " " T9201300F) |
| | | | P3 | P1090082 | 5047-15A ( " " T9201310E) |
| | | POWER TRANSFORMER | P4 | P1090086 | 5047-19A |
| PT1 | L3030028 | 52-74 | P5 | P1090082 | 5047-15A (with wire T9201330E) |
| | | | P6 | P1090075 | 5047-08A |
| | | | P7 | P1090072 | 5047-05A (with wire T9201350A) |
| | | | P8 | P1090075 | 5047-08A ( " " T9201310E) |
| | | RELAY | P9 | P1090079 | 5047-12A ( " " T9201310D) |
| RL1 | M1190004 | FRL-263 D012/04CS01 | P10 | P1090083 | 5047-16A ( " " T921370D) |
| RL2 | M1090002 | MX2P | P18 | P1090070 | 5047-03A ( " " T9201420C) |
| | | | P11, 14, 22 | P0090045 | SQ4052 |
| | | | P15 | P0090002 | SI5908 |
| | | | P16 | P0090005 | SI-7502 |
| | | RELAY SOCKET | P19, 23 | P1090070 | 5047-03A |
| RLS1 | M1490010 | 263H204 | P20 | P1090075 | 5047-08A |
| RLS2 | M1490001 | PX08-1 | P21 | P0090075 | P-7015P |
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| | | | | | |
| | | SWITCH | | | FUSE |
| S1 | N0190070B | | F1 | Q0000005 | 5 A (100V−117V) |
| S2 | N0190090 | | | Q0000004 | 3 A (200V−234V) |
| S3* (Lot 1−7) | N0190025 | ESR-E485R20 | | | |
| S3* (Lot 8 →) | N0190037 | ESR-E486R20 | | | |
| S4, 5 | N7090005 | WD9223 | | | |
| | | | | | FUSE HOLDER |
| | | | FH1 | P2000012 | SN2059 |
| | | | FH2 | P2000003 | F3265 |
| | | COOLING FAN | | | |
| FAN1 | M2090001 | 2SB10A | | | |
| | | | | | |
| | | | | | PILOT LAMP |
| | | | PL1 | Q1000010 | BQ041-22803A |
| | | RECEPTACLE | PL2−5 | Q1000033 | K0252-6-8 (BQ054-32732B) |
| J1 | P1090004 | SG7814 | | | |
| J3 | P1090134 | SG7627 | | | |
| J2 | P0090011 | FM144S | | | |
| J4 | P1090033 | D6-701B00 | | Q5000010 | Thru terminal FT-SM1 |
| J5 | P1090075 | 5047-08 (with wire T9203200A) | | Q4000002 | " A339 (HV) |
| J6 | P1090014 | SI7501-1 | | Q6000042 | Terminal block ML-3182 20 P |
| J7 | P1090028 | M-BR-06D | | Q6000004 | " 1L2PS (2-0) |
| J8 | P1090040 | SA607B00 | | Q6000007 | " 1L3PS (2-0-1) |
| J9−14,18,21 | P1090133 | STR-01-H | | Q6000016 | " 1L5PS (4-0-1) |
| J15 | P1090230 | SG-8022 | | Q6000003 | " 1L2PS (1-0-1) |
| | P1090045 | AC9-PF | | Q6000008 | " 1L3P (3-0) |
| J17 | P0090047 | QS-DB6-ML | | Q6000011 | " 1L4P (2-0-2) |

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|---|---|---|
| | Q600005 | Terminal block 1L2P (0-2) |
| | Q6000014 | 〃 1L5P (3-0-2) |
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| | ***** LED B BOARD ***** | |
| PB-1390 | F0001390 | P.C. Board |
| D9 | G2090060 | GD4-203-SRD |

## RF UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| PB-2154A | F0002154A | Printed Circuit Board |
| | C0021540 | P.C.B. with components |
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| | | |
| | | |
| | | IC, FET & TRANSISTOR |
| Q102 | G2090135 | IC (Ring Module) ND487C2-3R |
| Q106 | G4800400M | FET 3SK40M |
| Q101 | G4800510C | 〃 3SK51-03 |
| Q103 | G3090019 | 〃 J310 |
| Q104, 105 | G3324070 | TR 2SC2407 |
| | | |
| | | |
| | | DIODE |
| D110 | G2010070 | Ge 1S1007 |
| D103, 104 | G2015550 | Si 1S1555 |
| D101, 102, 105–109 | G2090027 | 〃 1SS53 |
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| | | |
| | | RESISTOR |
| R122, 131 | J00245479 | Carbon film ¼W VJ 4.7 Ω |
| R109,110,115, 116,124,125, 140 | J00245100 | 〃 〃 〃 〃 10 Ω |
| R135 | J00245560 | 〃 〃 〃 〃 56 Ω |
| R106,107,113, 114,139 | J00245101 | 〃 〃 〃 〃 100 Ω |
| R108,117,126 | J00245121 | 〃 〃 〃 〃 120 Ω |
| R121, 130 | J00245151 | 〃 〃 〃 〃 150 Ω |
| R123,132 | J00245221 | 〃 〃 〃 〃 220 Ω |
| R136 | J00245331 | 〃 〃 〃 〃 330 Ω |
| R119, 128 | J00245561 | 〃 〃 〃 〃 560 Ω |
| R105,111,112, 120,129 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R118, 127 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R141 | J00245222 | 〃 〃 〃 〃 2.2 kΩ |
| R102 | J00245272 | 〃 〃 〃 〃 2.7 kΩ |
| R104, 133 | J00245562 | 〃 〃 〃 〃 5.6 kΩ |
| R138 | J00245103 | 〃 〃 〃 〃 10 kΩ |
| R137 | J00245183 | 〃 〃 〃 〃 18 kΩ |
| R103, 134 | J00245393 | 〃 〃 〃 〃 39 kΩ |
| R101 | J00245225 | 〃 〃 〃 〃 2.2 MΩ |

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|---|---|---|
| | | CAPACITOR |
| C138 | K02179003 | Ceramic 50WV CH 2 pF |
| C106 | K02172040 | 〃 〃 〃 4 pF |
| C125, 126 | K00175680 | 〃 〃 SL 68 pF |
| C103 | K00175101 | 〃 〃 〃 100 pF |
| C124 | K30176391 | 〃 〃 〃 390 pF |
| C102,104,116, 119–121, 130,131,135, 140,144,145 | K13170103 | 〃 〃 0.01 μF |
| C101, 105, 107–115, 117, 118, 122, 123, 127–129, 132–134, 136,137,139, 142, 143 | K13170473 | 〃 〃 0.047 μF |
| C141 | K40120336 | Electrolytic 16WV 33 μF |
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| | | TRIMMER CAPACITOR |
| TC101 | K91000019 | ECV-1ZW 10 x 40 10 pF |
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| | | INDUCTOR |
| L107 | L0020491 | 0.32 μH |
| L108 | L1190005 | FL4H-1R0M 1 μH |
| L112 | L1190033 | FL5H-820K 82 μH |
| L102,103,105, 106,113,114 | L1190016 | FL5H-101K 100 μH |
| L104,109,111 | L1190020 | FL5H-151K 150 μH |
| L101,110,115 | L1190038 | FL5H-271K 270 μH |
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| | | TRANSFORMER |
| T101–103 | L0020788A | |
| T104 | L0020221A | |
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| | | JACK |
| J101–103 | P1090018 | SQ-3081 |
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## NB-FIX UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019610 | NB-FIX unit with components |
| PB-1961B | F0001961B | P.C. Board |
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| | | TRANSISTOR |
| Q201–204 | G3303720Y | 2SC372Y |
| Q205, 206 | G3315830 | 2SC1583 |

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|---|---|---|
| | | **DIODE** |
| D201–204 | G2090029 | Ge 1N60 |
| D205–209 | G2015550 | Si 1S1555 |
| | | |
| | | **RESISTOR** |
| R208,216,224, 230,238,239 | J00245101 | Carbon film 1/4W VJ 100 Ω |
| R204 | J00245221 | " " " " 220 Ω |
| R222, 236 | J00245471 | " " " " 470 Ω |
| R231–233,235 | J00245561 | " " " " 560 Ω |
| R206,215,221, 234,237 | J00245102 | " " " " 1 kΩ |
| R207 | J00245222 | " " " " 2.2 kΩ |
| R240 | J10245472 | " " " TJ 4.7 kΩ |
| R210 | J00245472 | " " " VJ 4.7 kΩ |
| R205,209,218 | J00245562 | " " " " 5.6 kΩ |
| R202,203,212, 214,225,226 | J00245103 | " " " " 10 kΩ |
| R201,220,223 | J00245153 | " " " " 15 kΩ |
| R211,213,219 | J00245223 | " " " " 22 kΩ |
| R217 | J00245683 | " " " " 68 kΩ |
| | | |
| | | **CAPACITOR** |
| C216–218 | K30176331 | Dipped mica 50WV 330 pF |
| C234, 236 | K30176471 | " " " 470 pF |
| C235 | K30176821 | " " " 820 pF |
| C208, 209 | K02175150 | Ceramic 50WV NPO 15 pF |
| C206 | K00179005 | " " SL 20 pF |
| C204 | K00175101 | " " " 100 pF |
| C201 | K00175331 | Ceramic disc " " 330 pF |
| C202,203,205, 211,212,221, 225–227, 229–233 | K13170103 | Ceramic " 0.01 µF |
| C207,210,213, 215,219,220, 223,224,228, 237 | K13170473 | " " 0.047 µF |
| C214 | K40170105 | Electrolytic " 1 µF |
| C238 | K40140475 | 10WV 4.7 µF |
| | | |
| | | **TRIMMER CAPACITOR** |
| TC201, 202 | K91000016 | ECV-1ZW 50 x 32 50 pF |
| | | |
| | | **INDUCTOR** |
| L207, 208 | L1190007 | FL-4H 1R8K 1.8 µH |
| L204–206 | L1190016 | FL-5H 101K 100 µH |
| L201–203 | L1190017 | FL-5H 102K 1 mH |
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| | | **TRANSFORMER** |
| T201, 202 | L0020140 | R12-4170 |

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|---|---|---|
| | | **CRYSTAL SOCKET** |
| XS201 | P3090025 | S-14 2P |
| | | |
| | | **MINI CONNECTOR** |
| J201 | P0090037 | 5048-08A |
| J202 | P0090038 | 5048-12A |

## PREMIX UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0021520 | PREMIX unit with components |
| PB-2152C | F0002152C | P.C. Board |
| | | |
| | | **IC, FET, TRANSISTOR** |
| Q303 | G1090062 | IC SN76514N |
| Q301, 302 | G3319230R | TR 2SC1923R |
| | | |
| | | **DIODE** |
| D301–318 | G2090027 | Si 1SS53 |
| | | |
| | | **RESISTOR** |
| R323 | J00245100 | Carbon film 1/4W VJ 10 Ω |
| R331 | J00245680 | " " " " 68 Ω |
| R301,303,305, 307,309,311, 313,315,332, 333 | J00245101 | " " " " 100 Ω |
| R317 | J02245101 | " " " SJ 100 Ω |
| R322,324,327, 328,336 | J00245221 | " " " VJ 220 Ω |
| R337 | J02245102 | " " " SJ 1 kΩ |
| R319, 334 | J00245152 | " " " VJ 1.5 kΩ |
| R335 | J00245182 | " " " " 1.8 kΩ |
| R329, 330 | J00245222 | " " " " 2.2 kΩ |
| R302,304,308, 310,312,314, 316,318,321, 325,326 | J00245103 | " " " " 10 kΩ |
| R320 | J00245333 | " " " " 33 kΩ |
| | | |
| | | **POTENTIOMETER** |
| VR301 | J50710502 | V10K-8-1-2 5 kΩB |
| | | |
| | | **CAPACITOR** |
| C335 | K30176271 | Dipped mica 50WV 270 pF |
| C331 | K30176331 | " " " 330 pF |

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|---|---|---|
| C341 | K30176391 | Dipped mica 50WV 390 pF |
| C311,315,319 | K30176561 | " " " 560 pF |
| C323, 327 | K30176681 | " " " 680 pF |
| C307 | K30176751 | " " " 750 pF |
| C301,305,309, 313,317,321, 325,329,333, 337–339,343, 345–351 | K13170103 | Ceramic " 0.01 μF |
| C302,304,306, 308,310,312, 314,316,318, 320,322,324, 326,328,330, 332,334,336, 340,342,344 | K13170473 | " " 0.047 μF |
| C303 | K50177102 | Mylar " 0.001 μF |
| | | **INDUCTOR** |
| L302 | L1190007 | FL4H-1R8M 1.8 μH |
| L303 | L1190005 | FL4H-1R0M 1 μH |
| L301,304–306 | L1190017 | FL5H-102K 1 mH |
| | | **TRANSFORMER** |
| T301, 302 | L0020500 | |
| T303, 304 | L0020501 | |
| T305, 306 | L0020502 | |
| T307, 308 | L0020835 | |
| T309, 310 | L0020504 | |
| T311, 312 | L0020836 | |
| T313, 314 | L0020837 | |
| T315, 316 | L0020838 | |
| T317, 318 | L0020839 | |
| T319 | L0020210 | |
| | | **JACK** |
| J301 | P1090018 | SQ3081 |
| P301 | P0090045 | SQ4052 |



## IF UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019630 | IF unit with components |
| PB-1963C | F0001963C | P.C. Board |
| | | **IC, FET, TRANSISTOR** |
| Q403 | G1090063 | IC TA7060P |
| Q406 | G3090036 | FET 2SK19TM-BL |
| Q413, 414 | G3090034 | " 2SK19TM-Y |
| Q402,419,425 | G3090035 | FET 2SK19TM-GR |
| Q401,405,412, 415, 416 | G4800510C | " 3SK51-03 |
| Q408 | G3090019 | J310 |
| Q407, 420 | G3105641 | TR 2SA564A |
| Q404,409,410, 417, 418, 422–424 | G3303720Y | " 2SC372Y |
| Q421 | G3305350A | " 2SC535A |
| Q411 | G3090005 | " MPSA13 |
| | | **DIODE** |
| D416, 417 | G2090029 | Ge 1N60 |
| D414, 421 | G2010070 | " (GB) 1S1007 |
| D405–408, 425–428 | G2090118 | " 1SS97 |
| D401–404, 409–413, 419, 424 | G2015550 | Si 1S1555 |
| D418 | G2022090 | Varactor 1S2209 |
| D422 | G2090040 | " FC63 |
| D420, 423 | G2090010 | Zener WZ090 |
| | | **CRYSTAL** |
| X401 | H0100433 | HC-18/U 19.7475 MHz |
| | | **CRYSTAL FILTER** |
| XF401 | H1100860 | XF8.9HS |
| XF402(Option) | H1100880 | XF8.9HC |
| XF403 | H1100890 | XF8.9HP |
| XF404 | H1100470 | 8.9M20A |
| XF405 | H1100900 | XF10GS (XF-10HW) |
| | | **THERMISTOR** |
| TH401 | G9090003 | D-33A |
| | | **RESISTOR** |
| R0520 | J00245220 | Carbon film 1/4W VJ 22 Ω |
| R410, 411 | J01245101 | " " " TJ 100 Ω |
| R402,408,419, 422,423,437, 439,444,446, 463,464,469, 475,482,483, 497 | J00245101 | " " " VJ 100 Ω |
| R425,447,451, 486, 0507, 0508 | J00245221 | " " " " 220 Ω |
| R502 | J00245331 | " " " " 330 Ω |
| | J00245391 | " " " " 390 Ω |

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|---|---|---|---|
| R443 | J00245471 | Carbon film 1/4W VJ | 470 Ω |
| R474, 480, 0522 | J00245561 | " " " " | 560 Ω |
| R467, 468 | J00245681 | " " " " | 680 Ω |
| | J00245821 | " " " " | 820 Ω |
| R406,416,428, 440,442,449, 453,457,459, 462,488,494, 0504, 0506, 0515 | J00245102 | " " " " | 1 kΩ |
| R429 | J00245122 | " " " " | 1.2 kΩ |
| R495, 0516 | J00245152 | " " " " | 1.5 kΩ |
| | J01245152 | " " " TJ | 1.5 kΩ |
| R454,455,458, 0510 | J00245222 | " " " VJ | 2.2 kΩ |
| R460 | J00245272 | " " " " | 2.7 kΩ |
| R401,409,412, 413,431,456, 496, 0511 | J00245332 | " " " " | 3.3 kΩ |
| R426,427,476 | J00245472 | " " " " | 4.7 kΩ |
| R403,455,481, 489 | J00245562 | " " " " | 5.6 kΩ |
| R434, 450 | J00245682 | " " " " | 6.8 kΩ |
| R404,407,420, 421,424,436, 471,477,484, 485,491,492, 0501, 0509, 0512 | J00245103 | " " " " | 10 kΩ |
| R433 | J01245103 | " " " TJ | 10 kΩ |
| R470 | J00245123 | " " " VJ | 12 kΩ |
| R415,438,498, 499 | J00245153 | " " " " | 15 kΩ |
| R414 | J00245273 | " " " " | 27 kΩ |
| R461,472,478, 0500 | J00245473 | " " " " | 47 kΩ |
| R405,465,466 | J00245104 | " " " " | 100 kΩ |
| R493 | J00245154 | " " " " | 150 kΩ |
| R448,452,487, 0503, 0505 | J00245184 | " " " " | 180 kΩ |
| | J00245334 | " " " " | 330 kΩ |
| R0521 | J01245274 | " " " TJ | 270 kΩ |
| R432 | J00245684 | " " " VJ | 680 kΩ |
| R490 | J00245105 | " " " " | 1 MΩ |
| | J00245225 | " " " " | 2.2 MΩ |
| R0519 | J10246565 | " composition " GK | 5.6 MΩ |
| | | **POTENTIOMETER** | |
| VR401, 402 | J51723102 | SR-19R | 1 kΩB |
| VR403, 404 | J51723103 | " | 10 kΩB |
| VR405 | J51723473 | " | 47 kΩB |
| VR407 | J50705502 | EVN-A1A-A00B53 | 5 kΩB |
| VR406 | J50705504 | EVN-A1A-A00B55 | 500 kΩB |

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| | | **CAPACITOR** | |
| C477 | K30176221 | Dipped mica 50WV | 220 pF |
| C445, 472 | K02173100 | Ceramic " CH | 10 pF |
| C488, 492 | K06175330 | " " UJ | 33 pF |
| C489 | K06175390 | " " " | 39 pF |
| C404,421,432 | K02175470 | " " CH | 47 pF |
| C487 | K06175101 | " " UJ | 100 pF |
| C459,464,475 | K02175101 | " " CH | 100 pF |
| C401,405,406, 411,413,415, 417,419,420, 423,424,428, 430,431,433, 435,440,442, 443,446,448, 451–455, 460,465,482, 484–486, 490,491,493, 494,497 | K13170103 | " " | 0.01 µF |
| C402,403,407, 408,410,412, 414,416,418, 422,425–427, 429,436–438, 441,444,447, 457,458,462, 463,468–471 473,474,495, 498 | K13170473 | " " | 0.047 µF |
| C449 | K14179003 | " " | 0.1 µF |
| C461, 467 | K50177103 | Mylar " | 0.01 µF |
| C478 | K50177223 | " " | 0.022 µF |
| C409,439,456, 466,480,481, 483 | K50177473 | " " | 0.047 µF |
| C434 | K70167224 | Tantalum 35WV | 0.22 µF |
| C479 | K70127225 | " " | 2.2 µF |
| C450,476,496 | K40120106 | Electrolytic 16WV | 10 µF |
| | | **INDUCTOR** | |
| L401–408, 410, 413 | L1190016 | FL-5H 101K | 100 µH |
| L411, 412 | L1190038 | FL-5H 271K | 270 µH |
| L409 | L0020145 | 5.2 µH 220145 | |
| | | **TRANSFORMER** | |
| T410 | L0020150 | R12-4074 | |
| T402,403,404, 407,409,413, 414 | L0020140 | R12-4170 | |

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|---|---|---|
| T401,406,408, 415 | L0020141 | R12-4171 |
| T405 | L0020221 | |
| T411 | L0020460 | |
| T412 | L0020209 | |
| | | **MINI CONNECTOR** |
| J401 | P0090038 | 5048-12A |
| J402 | P0090039 | 5048-13A |
| J403 | P0090040 | 5048-15A |
| TP401–412 | Q5000011 | Wrapping terminal C |

## AF UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019640 | AF unit with components |
| PB-1964A | F0001964A | P.C. Board |
| | | **IC, FET, TRANSISTOR** |
| Q503 | G1090077 | IC MC3403P (μPC324C) |
| Q506 | G1090064 | " MC14024B |
| Q504 | G1090100 | " SN74LS123N |
| Q502 | G1090086 | " TA7063P |
| Q501 | G1090164 | " μPC2002H |
| Q505 | G1090120 | " NJM78L05 |
| Q514 | G3090035 | FET 2SK19TM-GR |
| Q515 | G3105641 | TR 2SA564A |
| | G3303730 | " 2SC373 |
| Q507, 508 | G3307320G | " 2SC732TM-GR |
| | G3310000G | " 2SC1000GR |
| Q512 | G3313830 | " 2SC1383 |
| Q509,510,513, 516 | G3318150Y | " 2SC1815Y |
| Q511 | G3318150G | " 2SC1815GR |
| | | **DIODE** |
| D510, 511 | G2090029 | Ge 1N60 |
| D502–505 | G2090118 | " 1SS97 |
| D507–509, 512–517, 519–522 | G2015550 | Si 1S1555 |
| D501, 518 | G2090001 | " 10D1 |
| D506 | G2090027 | " 1SS53 |
| | | **CRYSTAL** |
| X501 | H0100260 | HC-6/W 3200 kHz |
| X502 | H0100421 | HC-18/U 8986 kHz |
| X503 | H0100422 | HC-18/U 8988.3 kHz |
| X504 | H0100423 | " 8989 kHz |
| | | **RESISTOR** |
| | J00245560 | Carbon film 1/4W VJ 56 Ω |
| R509,539,557 | J00245101 | " " " " 100 Ω |
| R511 | J00245121 | " " " " 120 Ω |
| R533, 546 | J00245151 | " " " " 150 Ω |
| R503,513,524, 525 | J00245221 | " " " " 220 Ω |
| R512,522,538 | J00245471 | " " " " 470 Ω |
| R504,514,520, 523,548,561 | J00245102 | " " " " 1 kΩ |
| R515 | J00245222 | " " " " 2.2 kΩ |
| R534,535,565 | J00245272 | " " " " 2.7 kΩ |
| R510,562,569, 578–580 | J00245332 | " " " " 3.3 kΩ |
| | J01245472 | " " " TJ 4.7 kΩ |
| R510,506,531, 536,537,544, 545,549,550, 563,566,575, 576,581 | J00245472 | " " " VJ 4.7 kΩ |
| R521,527,532 | J00245562 | " " " " 5.6 kΩ |
| R541,542,568, 570 | J00245682 | " " " " 6.8 kΩ |
| R501,507,519, 529,555,556, 558,571,572 | J00245103 | " " " " 10 kΩ |
| R517, 551 | J00245153 | " " " " 15 kΩ |
| R508,518,528, 540,554,573 | J00245223 | " " " " 22 kΩ |
| R584 | J01245223 | " " " TJ 22 kΩ |
| R559 | J00245393 | " " " VJ 39 kΩ |
| R567 | J00245473 | " " " " 47 kΩ |
| R516 | J00245563 | " " " " 56 kΩ |
| R547, 574 | J00245104 | " " " " 100 kΩ |
| R560 | J00245154 | " " " " 150 kΩ |
| R553 | J00245224 | " " " " 220 kΩ |
| R526 | J00245274 | " " " " 270 kΩ |
| R552,564,577 | J00245474 | " " " " 470 kΩ |
| R582 | J00245824 | " " " " 820 kΩ |
| R505 | J10276229 | composition 1/2W GK 2.2 Ω |
| R502 | J32276010 | Wire wound 1W 1 Ω |
| | | **POTENTIOMETER** |
| VR501 | J51727101 | CR-19R 100 ΩB |
| | | **CAPACITOR** |
| C513 | K30176511 | Dipped mica 50WV 510 pF |
| C511 | K02172050 | Ceramic " CH 5 pF |
| C522 | K02173100 | " " " 10 pF |
| C514 | K06175270 | " " VJ 27 pF |
| C546–548 | K02175390 | " " CH 39 pF |

| | | |
|---|---|---|
| C510,532,534, 555, 566 | K02175101 | Ceramic 50WV CH 100 pF |
| C533 | K02175151 | 〃 〃 〃 150 pF |
| C558, 559 | K00179020 | 〃 〃 SL 240 pF |
| C512 | K06175271 | 〃 〃 UJ 270 pF |
| C504,519–521, 523,531,535, 542–545,570 | K13170103 | 〃 〃 0.01 μF |
| C509,537,574 | K13170473 | 〃 〃 0.047 μF |
| C516 | K50177102 | Mylar 50WV 0.001 μF |
| C526 | K50177472 | 〃 〃 0.0047 μF |
| C518,529,530, 572 | K50177103 | 〃 〃 0.01 μF |
| C525,539–541 | K50177223 | 〃 〃 0.022 μF |
| C528,556,569, 573 | K50177473 | 〃 〃 0.047 μF |
| C503 | K50177104 | 〃 〃 0.1 μF |
| C507,517,527, 550,551,560, 567,568,571 | K40170105 | Electrolytic 〃 1 μF |
| C557 | K40170225 | 〃 〃 2.2 μF |
| C561 | K40170335 | 〃 〃 3.3 μF |
| C536 | K40140475 | 〃 25WV 4.7 μF |
| C505,515,538, 552,554,564, 565 | K40120106 | 〃 16WV 10 μF |
| C524,553,563 | K40120226 | 〃 〃 22 μF |
| C508 | K40120476 | 〃 〃 47 μF |
| C501 | K40120107 | 〃 〃 100 μF |
| C506 | K40120227 | 〃 〃 220 μF |
| C502 | K40120477 | 〃 〃 470 μF |
| C562 | K40120336 | 〃 〃 33 μF |
| | | **TRIMMER CAPACITOR** |
| TC501–505 | K91000013 | ECV-1ZW 20 x 32 20 pF |
| | | **INDUCTOR** |
| L502 | L1190023 | FL-5H 220K 22 μH |
| L501 | L1190038 | FL-5H 271K 270 μH |
| L503–506 | L1190017 | FL-5H 102K 1 mH |
| | | **TRANSFORMER** |
| T501 | L0020209 | |
| | | **RELAY** |
| RL501 | M1190002 | FBR211A D012M |
| | | **MINI CONNECTOR** |
| J501 | P0090043 | 5048-19A |
| J502 | P0090040 | 5048-15A |
| J503 | P0090037 | 5048-08A |
| J504 | P0090042 | 5048-05A |
| J505 | P0090041 | 5048-03A |
| | R0042800A | **HEAT SINK** |



## PREMIX LOCAL UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0021530 | PREMIX LOCAL unit with components |
| PB-2153A | F0002153A | P.C. Board |
| | | **TRANSISTOR** |
| Q601–612 | G3303800Y | 2SC380TMY |
| | | **DIODE** |
| D601–612 | G2015550 | Si 1S1555 |
| | | **RESISTOR** |
| R605,610,615, 620,625,628, 630,631,636, 637,641,642, 646,647,651, 652,656,657 | J00245101 | Carbon film 1/4W VJ 100 Ω |
| R632 | J00245151 | 〃 〃 〃 〃 150 Ω |
| R618 | J00245221 | 〃 〃 〃 〃 220 Ω |
| R623 | J00245271 | 〃 〃 〃 〃 270 Ω |
| R603,608,613 | J00245561 | 〃 〃 〃 〃 560 Ω |
| R604,609,614, 619,624,629, 633,638,643, 648,653,658 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R662 | J00245182 | 〃 〃 〃 〃 1.8 kΩ |
| R661, 663 | J00245222 | 〃 〃 〃 〃 2.2 kΩ |
| R602,607,612, 617,622,627, 634,639,644, 649,654,659 | J00245333 | 〃 〃 〃 〃 33 kΩ |
| R601,606,611, 616,621,626, 635,640,645, 650,655,660 | J00245563 | 〃 〃 〃 〃 56 kΩ |
| | | **CAPACITOR** |
| C607 | K30176271 | Dipped mica 50WV 270 pF |
| C603 | K30176331 | 〃 〃 〃 330 pF |

| | | |
|---|---|---|
| C643, 638, 642, 646 | K02175470 | Ceramic 50WV CH 47 pF |
| C630 | K02175560 | ″ ″ ″ 56 pF |
| C626 | K02175680 | ″ ″ ″ 68 pF |
| C623 | K02175820 | ″ ″ ″ 82 pF |
| C619 | K02175101 | ″ ″ ″ 100 pF |
| C615 | K02175151 | ″ ″ ″ 150 pF |
| C611 | K02179023 | ″ ″ ″ 180 pF |
| C601, 602, 604–606, 608–610, 612–614, 616–618, 620–622, 624, 625, 627–629, 631–633, 635–647, 639–641, 643–645, 647–649 | K13170103 | ″ ″ 0.01 μF |
| | | **CRYSTAL** |
| X601 | H0101470 | HC-18/U 15.9875 MHz |
| X602 | H0101480 | ″ 17.9875 MHz |
| X603 | H0101490 | ″ 21.4875 MHz |
| X604 | H0102294A | ″ 24.4875 MHz |
| X605 | H0101500 | ″ 28.4875 MHz |
| X606 | H0102295A | ″ 32.4875 MHz |
| X607 | H0101510 | ″ 35.4875 MHz |
| X608 | H0102296A | ″ 38.9875 MHz |
| X609 | H0101520 | ″ 42.4875 MHz |
| X610 | H0101530 | ″ 42.9875 MHz |
| X611 | H0101540 | ″ 43.4875 MHz |
| X612 | H0101550 | ″ 43.9875 MHz |
| | | **TRANSFORMER** |
| T601–612 | L0020017 | |
| | | **INDUCTOR** |
| L601 | L1190016 | FL5H-101K 100 μH |

## SELECT SWITCH UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019660 | SELECT SW unit with components |
| PB-1966C | F0001966C | P.C. Board |
| | | **DIODE** |
| D701 | G2090001 | Si 10D1 |
| | | **RELAY** |
| RL701 | M1190002 | FBR211A D012M |
| | | **SWITCH** |
| S701 | N4090006 | 6B0003CC2060 |
| | | **MINI CONNECTOR** |
| J701 | P0090049 | 5049-16A |

## VFO UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0014400 | VFO assembly 3420 |
| | | PCB with components |
| PB-1440B | F0001440B | P.C. Board |
| | | **FET & TRANSISTOR** |
| Q802 | G3090035 | FET 2SK19TM-GR |
| Q801, 803 | G3303800Y | Transistor 2SC380TM-Y |
| | | **DIODE** |
| D801 | G2022360 | Varactor 1S2236 |
| | | **RESISTOR** |
| R809, 811 | J00245101 | Carbon film 1/4W VJ 100 Ω |
| R807 | J00245221 | ″ ″ ″ ″ 220 Ω |
| R805, 808 | J00245222 | ″ ″ ″ ″ 2.2 kΩ |
| R802 | J00245332 | ″ ″ ″ ″ 3.3 kΩ |
| R801 | J00245103 | ″ ″ ″ ″ 10 kΩ |
| R803 | J00245183 | ″ ″ ″ ″ 18 kΩ |
| R804 | J00245223 | ″ ″ ″ ″ 22 kΩ |
| R806, 810 | J00245104 | ″ ″ ″ ″ 100 kΩ |
| | | **CAPACITOR** |
| C827 | K02179001 | Ceramic disc 50WV CH 1 pF |
| C829 | K02179003 | ″ ″ ″ ″ 2 pF |
| C828 | K06172040 | ″ ″ ″ UJ 4 pF |
| C807 | K02173080 | ″ ″ ″ CH 8 pF |
| C801 | K06173080 | ″ ″ ″ UJ 8 pF |
| C803 | K06173100 | ″ ″ ″ ″ 10 pF |
| C804 | K02175180 | ″ ″ ″ CH 18 pF |
| C805 | K02179012 | ″ ″ ″ ″ 30 pF |
| C814 | K02179013 | ″ ″ ″ ″ 33 pF |
| C808, 818 | K02175390 | ″ ″ ″ ″ 39 pF |

| | | |
|---|---|---|
| C811 | K02179023 | Ceramic disc 50WV CH 180 pF |
| C821, 823 | K00175471 | 〃 〃 〃 〃 470 pF |
| C809,810,812, 815,819,820, 824,826 | K13170103 | 〃 〃 〃 0.01 μF |
| C813 | K30176431 | Dipped mica 〃 430 pF |
| C802, 822 | K30209001 | 〃 〃 〃 1000 pF |
| C825 | K70167334 | Tantalum 10WV 0.33 μF |
| | | **VARIABLE CAPACITOR** |
| VC801 | K90000024 | C521 R112 |
| | | **TRIMMER CAPACITOR** |
| TC801 | K90000001 | TSN-100D15 15 pF |
| TC802 | K91000016 | ECV-1ZW 50 x 32 50 pF |
| | | **INDUCTOR** |
| L801 | L0020268A | |
| L804, 805 | L1190007 | Micro inductor FL-4H 1.8 μH |
| L803, 806 | L1190001 | 〃 〃 EL0710 250 μH |
| L802 | L1190040 | 〃 〃 S4 102K 1 mH |
| | | **RECEPTACLE** |
| J801 | P1090012 | SI-6303-1 |
| | | **TERMINAL** |
| | Q5000005 | Lighthouse type |
| | Q5000011 | Wrapping terminal C |

**RECT. A UNIT**

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019670 | RECT. A unit with components |
| PB-1967 | F0001967 | P.C. Board |
| | | **IC, TRANSISTOR** |
| Q901 | G1090162 | IC μPC78L12 |
| Q903 | G3110150Y | TR 2SA1015Y |
| | | **DIODE** |
| D907 | G2090001 | Si 10D1 |
| D901−904 | G2090002 | 〃 10D10 |
| D905, 906 | G2090003 | 〃 V06B |
| D908 | G2090007 | Zener WZ061 |
| | | **RESISTOR** |
| R908 | J01245560 | Carbon film 1/4W TJ 56 Ω |
| R905 | J10276220 | 〃 composition 1/2W GK 22 Ω |
| R901−904 | J10276474 | 〃 〃 〃 〃 470 kΩ |
| R907 | J20339001 | Metallic film 2W 0.4 Ω |
| | | **CAPACITOR** |
| C901−905 | K13170103 | Ceramic 50WV 0.01 μF |
| C908−911 | K40140106 | Electrolytic 25WV 10 μF |
| C907 | K40140107 | 〃 〃 100 μF |
| C906 | K41140338 | 〃 〃 3300 μF |
| | | **RELAY** |
| RL901 | M1190003 | FRL-264 D012/04CS-01 |
| | Q5000011 | Wrapping terminal C |
| | Q5000004 | Test point D |

**RECT. B UNIT**

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019680 | RECT. B unit with components |
| PB-1968C | F0001968C | P.C. Board |
| | | **TRANSISTOR** |
| Q1003 | G3106390 | 2SA639 |
| Q1001 | G3107330 | 2SA733 |
| Q1002 | G3303720Y | 2SC372Y |
| | | **DIODE** |
| D1004, 1005, 1008−1011 | G2015550 | Si 1S1555 |
| D1002, 1003, 1012 | G2090002 | 〃 10D10 |
| D1006, 1007 | G2090001 | 〃 10D1 |
| D1001 | G2090081 | 〃 SM1-12 |
| | | **RESISTOR** |
| R1021 | J00245681 | Carbon film 1/4W VJ 680 Ω |
| R1011, 1016, 1020 | J00245472 | 〃 〃 〃 〃 4.7 kΩ |
| R1013, 1015 | J00245103 | 〃 〃 〃 〃 10 kΩ |
| R1014 | J00245123 | 〃 〃 〃 〃 12 kΩ |
| R1017−1019 | J00245223 | 〃 〃 〃 〃 22 kΩ |
| R1012 | J00245563 | 〃 〃 〃 〃 56 kΩ |
| R1010 | J20306562 | Metallic film 1W 5.6 kΩ |

| | | |
|---|---|---|
| | | **RESISTOR** |
| R2006 | J01245560 | Carbon film 1/4W TJ 56 Ω |
| R2005 | J01245101 | 〃 〃 〃 〃 100 Ω |
| R2001 | J01245121 | 〃 〃 〃 〃 120 Ω |
| R2002 | J01245391 | 〃 〃 〃 〃 390 Ω |
| R2008 | J00245562 | 〃 〃 〃 VJ 5.6 kΩ |
| R2004 | J01245683 | 〃 〃 〃 TJ 68 kΩ |
| | | **SWITCH** |
| S2001–2004 | N3090002 | SLE62301 |
| S2005 | N3090008 | SLE64251 |

## DISPLAY UNIT (3420)

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0020982 | P.C.B. with components |
| PB-2098A | F0002098A | Printed Circuit Board |
| | | **DISPLAY LED** |
| D2201–2206 | G2090069 | HP5082-7623 |
| | | **PLUG** |
| P2201 | P1090073 | 5047-06 (with wire T9202430) |
| P2202 | P1090075 | 5047-08 ( 〃 〃 T9202440A) |

## COUNTER UNIT (3420)

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0020862 | P.C.B. with components |
| PB-2086B | F0002086B | Printed Circuit Board |
| | | **IC, FET & TRANSISTOR** |
| Q2312 | G1090249 | IC MSM9520RS |
| Q2320 | G1090079 | 〃 μPA54H |
| Q2305 | G1090299 | 〃 μPC7805H |
| Q2301 | G4800730G | FET 3SK73GR |
| Q2321 | G3104960Y | TR 2SA496Y |
| Q2306–2311, 2313–2319 | G3109520L | 〃 2SA952L |
| Q2303 | G3316740L | 〃 2SC1674L |
| Q2304 | G3318150G | 〃 2SC1815GR |
| | | **DIODE** |
| D2301–2313 | G2015550 | Si 1S1555 |
| | | **CRYSTAL** |
| X2301 | H0102272 | HC-18/U 6.5536 MHz |
| | | **RESISTOR** |
| R2312 | J00245100 | Carbon film 1/4W VJ 10 Ω |
| R2331, 2334, 2337, 2340, 2343, 2346, 2349 | J01245330 | 〃 〃 〃 TJ 33 Ω |
| R2350 | J00245560 | 〃 〃 〃 VJ 56 Ω |
| R2308, 2318, 2320, 2322, 2324, 2326, 2328 | J00245101 | 〃 〃 〃 〃 100 Ω |
| R2301 | J01245221 | 〃 〃 〃 TJ 220 Ω |
| R2307, 2310, 2311 | J00245221 | 〃 〃 〃 VJ 220 Ω |
| R2352 | J00245331 | 〃 〃 〃 〃 330 Ω |
| R2351 | J00245471 | 〃 〃 〃 〃 470 Ω |
| R2317, 2319, 2321, 2323, 2325, 2327 | J01245102 | 〃 〃 〃 TJ 1 kΩ |
| R2330, 2333, 2336, 2339, 2342, 2345, 2348 | J00245102 | 〃 〃 〃 VJ 1 kΩ |
| R2329, 2332, 2335, 2338, 2341, 2344, 2347 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R2302, 2315 | J00245562 | 〃 〃 〃 〃 5.6 kΩ |
| R2313 | J00245103 | 〃 〃 〃 〃 10 kΩ |
| R2309 | J00245473 | 〃 〃 〃 〃 47 kΩ |
| R2304 | J01245473 | 〃 〃 〃 TJ 47 kΩ |
| R2314 | J01245104 | 〃 〃 〃 〃 100 kΩ |
| R2316 | J00245104 | 〃 〃 〃 VJ 100 kΩ |
| | | **CAPACITOR** |
| C2324 | K02179008 | Ceramic 50WV CH 20 pF |
| C2325 | K02175820 | 〃 〃 〃 82 pF |
| C2320 | K02175101 | Electrolytic 16WV 〃 100 pF |
| C2301, 2304 | K13170102 | Ceramic 50WV CH 0.001 μF |
| C2302, 2305, 2308, 2309, 2311, 2312, 2314, 2315, 2317, 2319, 2321, 2326–2330 | K13170103 | 〃 〃 〃 0.01 μF |
| C2323 | K50177103 | Mylar 〃 0.01 μF |
| C2322 | K71137685 | Tantalum 20WV 6.8 μF |
| C2310, 2318 | K40120106 | Electrolytic 16WV 10 μF |
| C2313 | K40109011 | 〃 10WV 33 μF |
| C2316 | K40129001 | 〃 16WV 330 μF |

## TRIMMER C BOARD

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0010920 | TRIMMER C unit with components |
| PB-1092 | F1001092 | P.C. Board |
| | | **CAPACITOR** |
| C1406 | K30275180 | Dipped mica 500WV 18 pF |
| C1405 | K30276820 | 〃 〃 〃 82 pF |
| C1403 | K30276221 | 〃 〃 〃 220 pF |
| | K30276391 | 〃 〃 〃 390 pF |
| C1402 | K30279123 | 〃 〃 〃 710 pF |
| C1401 | K30279058 | 〃 〃 〃 2000 pF |
| | | **TRIMMER CAPACITOR** |
| TC1404, 1405 | K91000031 | B1PY 40 pF |
| TC1402, 1403 | K91000032 | B2PY 100 pF |
| TC1401 | K91000078 | BW6P-1 420 pF |

## APF UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0022170 | PCB with components |
| PB-2217 | F0002217 | Printed Circuit Board |
| | | **IC & TRANSISTOR** |
| Q1502 | G1090248 | IC AN6551 |
| Q1501 | G3318150Y | TR 2SC1815Y |
| | | **DIODE** |
| D1501 | G2090060 | LED GD4-203SRD |
| | | **RESISTOR** |
| R1506 | J00245820 | Carbon film 1/4W VJ 82 Ω |
| R1501 | J00245101 | 〃 〃 〃 〃 100 Ω |
| R1504 | J00245102 | 〃 〃 〃 〃 1 kΩ |
| R1514 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R1511, 1515, 1517 | J00245222 | 〃 〃 〃 〃 2.2 kΩ |
| R1516 | J00245272 | 〃 〃 〃 〃 2.7 kΩ |
| | J00245472 | 〃 〃 〃 〃 4.7 kΩ |
| R1502, 1508 | J00245103 | 〃 〃 〃 〃 10 kΩ |
| R1503, 1509 | J00245123 | 〃 〃 〃 〃 12 kΩ |
| R1505 | J00245473 | 〃 〃 〃 〃 47 kΩ |
| R1512 | J00245563 | 〃 〃 〃 〃 56 kΩ |
| R1513 | J00245104 | 〃 〃 〃 〃 100 kΩ |
| R1510 | J00245224 | 〃 〃 〃 〃 220 kΩ |
| R1507 | J00245474 | 〃 〃 〃 〃 470 kΩ |

| Symbol No. | Part No. | Description |
|---|---|---|
| | | **CAPACITOR** |
| C1501 | K13170103 | Ceramic 50WV 0.01 μF (DB201YF103Z5L5) |
| C1505, 1506 | K50177153 | Mylar 50WV 0.015 μF (50F2U153M) |
| C1503, 1504, 1508, 1509, 1511 | K40179001 | Electrolytic 50WV 1 μF (50RC2-1) |
| C1502, 1507, 1510 | K40129004 | Electrolytic 16WV 10 μF (16RE10) |
| | | **SWITCH** |
| S1501 | N4090008 | 1B0001AC2060 |

## DRIVER BOARD

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0017140 | Driver board with components (without vacuum tube) |
| PB-1714B | F0001714 | P.C. Board |
| | | **VACUUM TUBE** |
| V1601 | G6090002 | 12BY7A |
| | | **VACUUM TUBE SOCKET** |
| VS1601 | P3090022 | SB-9403 |
| | | **RESISTOR** |
| R1605 | J10276470 | Carbon composition 1/2W GK 47 Ω |
| R1602, 1604 | J10276560 | 〃 〃 〃 〃 56 Ω |
| R1603 | J10276101 | 〃 〃 〃 〃 100 Ω |
| R1601 | J10276473 | 〃 〃 〃 〃 47 kΩ |
| | | **CAPACITOR** |
| C1601, 1602 | K12279002 | Ceramic disc 500WV 0.01 μF |
| C1603, 1604, 1606 | K13170473 | 〃 〃 50WV 0.047 μF |
| C1605 | K30279051 | Dipped mica 500WV 1000 pF |
| | | **INDUCTOR** |
| L1601 | L1190020 | Micro inductor FL5H 150 μH |
| L1602(R1602) | L1020307 | |
| | Q5000011 | Wrapping terminal C |

## FINAL BOARD

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0017151 | Final board with components (without vacuum tube) |
| PB-1715B | F0001715B | P.C. Board |
| | | **VACUUM TUBE** |
| V1701, 1702 | G6090001 | 6146B |
| | | **VACUUM TUBE SOCKET** |
| VS1701, 1702 | P3090024 | SB-3606 |
| | | **DIODE** |
| D1701 | G2090002 | Si 10D10 |
| | | **RESISTOR** |
| R1701, 1702 (L1702, 1703) | J10276560 | Carbon composition 1/2W GK 56 Ω |
| R1703, 1704, 1705 | J10276101 | 〃 〃 〃 〃 100 Ω |
| R1706 | J31333010 | Meter shunt 2W 1 Ω |
| | | **CAPACITOR** |
| | K12279001 | Ceramic disc 500WV 0.001 μF |
| C1703 1704, 1710 | K12279002 | 〃 〃 〃 0.01 μF |
| C1705–1709, 1711, 1712 | K13170473 | 〃 〃 50WV 0.047 μF |
| C1701 | K31306102 | Moulded mica 1kWV 1000 pF |
| C1702 | K30273050 | Dipped mica 500WV 5 pF |
| | | **INDUCTOR** |
| L1701 | L1190020 | Micro inductor 150 μH |
| L1704 | L1190039 | 〃 〃 560 μH |
| L1702, 1703 (R1701,1702) | L1020307 | RF choke |
| | Q5000011 | Wrapping terminal C |

## CLARIFIER CONTROL UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019730 | CLAR.CONT.unit with components |
| PB-1973B | F0001973B | P.C. Board |

| Symbol No. | Part No. | Description |
|---|---|---|
| | | **DIODE** |
| D1801 | G2090001 | Si 10D1 |
| D1802 | G2090060 | LED GD4-203SRD |
| | | **RESISTOR** |
| R1803 | J00245102 | Carbon film 1/4W VJ 1 kΩ |
| R1804, 1805 | J00245152 | 〃 〃 〃 〃 1.5 kΩ |
| R1802 | J00245332 | 〃 〃 〃 〃 3.3 kΩ |
| R1801 | J00245472 | 〃 〃 〃 〃 4.7 kΩ |
| | | **POTENTIOMETER** |
| VR1801 | J50710501 | V10K8-1-2 500 ΩB |
| | | **CAPACITOR** |
| C1801–1803 | K13170473 | Ceramic 50WV 0.047 μF |
| | | **RELAY** |
| RL1801 | M1190002 | FBR211A D012M |
| | | **SWITCH** |
| SW1801 | N4090011 | 2B0005FC2060 |

## LED BOARD

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019740 | LED board with components |
| PB-1974A | F0001974A | P.C. Board |
| | | **LED** |
| D1901–1906 | G2090060 | GD4-203SRD |
| | | **RESISTOR** |
| R1901, 1902 | J01245102 | Carbon film 1/4W TJ 1 kΩ |

## LEVER SWITCH BOARD

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0019750 | LEVER SW board with components |
| PB-1975A | F0001975A | P.C. Board |

| | | |
|---|---|---|
| R1022 | J20306390 | Metallic film 1W 39 Ω |
| R1005 | J20336391 | 〃 〃 2W 390 Ω |
| R1006 | J20336471 | 〃 〃 〃 470 Ω |
| R1008 | J20336222 | 〃 〃 〃 2.2 kΩ |
| R1007 | J20336332 | 〃 〃 〃 3.3 kΩ |
| R1009 | J20336473 | 〃 〃 〃 47 kΩ |
| R1023 | J10276474 | Carbon composition ½W GK 470 kΩ |
| | | **POTENTIOMETER** |
| VR1001 | J50708103 | V18K3-2 10 kΩB |
| | | **CAPACITOR** |
| C1017 | K13170473 | Ceramic 50WV 0.047 μF |
| C1016 | K12279003 | 〃 500WV 0.0022 μF |
| C1005, 1006, 1013, 1018 | K12279004 | 〃 〃 0.0047 μF |
| C1010, 1014, 1015 | K12279002 | 〃 〃 0.01 μF |
| C1009 | K40240106 | Electrolytic 250WV 10 μF |
| C1011 | K40240336 | 〃 〃 33 μF |
| C1012 | K40240476 | 〃 〃 47 μF |
| C1001–1004 | K40270106 | 〃 450WV 10 μF |
| C1007, 1008 | K40260226 | 〃 350WV 22 μF |
| C1019 | K50177103 | Mylar 50WV 0.01 μF |
| | Q5000011 | Wrapping terminal C |

## CAPACITOR UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | | **CAPACITOR** |
| C1101, 1102 | K43279001 | Electrolytic 500WV 200 μF (CE-62LW) |

## TRIMMER A BOARD

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0021930 | TRIMMER A unit with components |
| PB-2193B | F0002193B | P.C. Board |
| | | **CAPACITOR** |
| C1203 | K30176271 | Dipped mica 50WV 270 pF |
| | K30176391 | 〃 〃 〃 390 pF |
| C1202 | K30176651 | 〃 〃 〃 650 pF |
| C1207 | K30209001 | 〃 〃 〃 1000 pF |
| C1201 | K30209004 | DM19D202K1 50WV 2000 pF |

| | | |
|---|---|---|
| C1206 | K02173100 | Ceramic 50WV CH 10 pF |
| C1205, 1210 | K02179012 | 〃 〃 〃 30 pF |
| C1204, 1209 | K02175820 | 〃 〃 〃 82 pF |
| | | **TRIMMER CAPACITOR** |
| TC1203 | K91000032 | B2PY 100 pF |
| TC1202 | K91000079 | BW3P-2 210 pF |
| | K91000033 | B7PY 470 pF |
| TC1206 | K91000013 | ECV-1ZW 20 x 32 20 pF |
| TC1204, 1205, 1208, 1209 | K91000016 | 〃 50 x 32 50 pF |
| TC1201 | K91000078 | BW6P-1 420 pF |
| TC1207 | K91000015 | ECV-1ZW 40 x 32 40 pF |
| | | **INDUCTOR** |
| L1201 | L0020545 | Trap coil |



## TRIMMER B BOARD

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0021920 | TRIMMER B unit with components |
| PB-2192B | F0002192B | P.C. Board |
| | | **CAPACITOR** |
| C1303 | K30176271 | Dipped mica 50WV 270 pF |
| | K30176391 | 390 pF |
| C1302 | K30176621 | 620 pF |
| C1301 | K30209004 | 2000 pF |
| C1307 | K02172050 | Ceramic 50WV CH 5 pF |
| C1304, 1308 | K02175680 | 68 pF |
| | | **TRIMMER CAPACITOR** |
| | K91000032 | B2PY 100 pF |
| TC1302 | K91000079 | BW3P-2 210 pF |
| TC1301 | K91000078 | BW6P-1 420 pF |
| TC1306 | K91000028 | ECV-1ZW 10 x 53 10 pF |
| TC1303–1305, 1308, 1309 | K91000016 | 〃 50 x 32 50 pF |
| TC1307 | K91000029 | 〃 20 x 53 20 pF |
| | | **RESISTOR** |
| R1303 | J00245562 | Carbon film 1/4W VJ 5.6 kΩ |

| | | |
|---|---|---|
| | | **TRIMMER CAPACITOR** |
| TC2301 | K91000030 | ECV-1ZW 40 x 53 40 pF |
| | | **INDUCTOR** |
| L2301 | L2030068 | |
| | | **CONNECTOR** |
| J2301 | P0090051 | 5048-06A |
| J2302 | P0090054 | 5048-07A |
| J2303 | P0090037 | 5048-08A |
| P2301 | P0090045 | SQ4052 |
| P2303 | P1090186 | 3021-03 (with wire T9201380A) |

## DC-DC CONVERTER (OPTION)

| Symbol No. | Part No. | Description |
|---|---|---|
| | | **TRANSISTOR** |
| Q3201, 3202 | G3090002 | T20A6 with insulator |
| | | **RESISTOR** |
| R3202 | J31306339 | Wire wound 1W 3.3 Ω |
| R3201 | J20376221 | Metallic film 5W 220 Ω |
| | | **CAPACITOR** |
| C3202 | K52247474 | Metallized paper 250WV 0.047 μF |
| C3201 | K41140227 | Electrolytic 25WV 220 μF |
| | | **CONNECTOR** |
| P3201 | P0090066 | AC9M |
| | T9012720 | DC POWER CORD |
| | Q0000009 | FUSE 20 A |

## ACCESSORIES

| Symbol No. | Part No. | Description |
|---|---|---|
| | | **AC POWER CORD** |
| | T9012380A | 2 wire, 2 prong plug |
| | T9012481A | 3 wire without plug |
| | T9012582A | 3 wire, 3 prong plug (UL) |
| | T9012484 | 3 wire, 3 prong Australian plug |
| | T9012683A | 3 wire, 2 prong EU plug |

| | | |
|---|---|---|
| | P0090065 | CONNECTOR PLUG QS-P6FL |
| | P0090018 | **PIN PLUG** STP58 |
| | P0090035 | **ACC PLUG** PA602B04 |
| | Q0000005 | **FUSE** (100V−117V) 5 A |
| | Q0000004 | ″ (200V−234V) 3 A |

## AM UNIT

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0020400 | AM unit with components |
| PB-2040 | F0002040 | P.C. Board |
| | | **FET & TRANSISTOR** |
| Q2404 | G3090035 | FET 2SK19TM-GR |
| Q2406 | G4800510C | ″ 3SK51-03 |
| Q2405, 2407, 2408 | G3303800Y | TR 2SC280TM-Y |
| Q2401 | G3307320G | ″ 2SC732TM-GR |
| Q2402, 2409 | G3318150Y | ″ 2SC1815Y |
| | | **DIODE** |
| D2406 | G2090029 | Ge. 1N60 |
| D2401, 2402, 2404, 2405 | G2015550 | Si. 1S1555 |
| | | **CRYSTAL** |
| X2401 | H0100422 | HC-18/U 8988.3 kHz |
| | | **RESISTOR** |
| R2441, 2457 | J00245470 | Carbon film 1/4W VJ 47 Ω |
| R2455 | J00245560 | ″ ″ ″ ″ 56 Ω |
| R2411, 2414, 2418, 2422, 2425, 2432, 2434, 2447 | J00245101 | ″ ″ ″ ″ 100 Ω |
| R2406, 2423 | J00245331 | ″ ″ ″ ″ 330 Ω |
| R2445, 2452 | J00245471 | ″ ″ ″ ″ 470 Ω |
| R2409, 2419, 2435, 2436, 2438, 2440, 2448 | J00245102 | ″ ″ ″ ″ 1 kΩ |
| R2437 | J01245102 | ″ ″ ″ TJ 1 kΩ |
| R2431 | J00245272 | ″ ″ ″ VJ 2.7 kΩ |
| R2401, 2410, 2453, 2456 | J00245332 | ″ ″ ″ ″ 3.3 kΩ |
| R2454 | J01245332 | ″ ″ ″ TJ 3.3 kΩ |
| R2404 | J00245392 | ″ ″ ″ VJ 3.9 kΩ |
| R2420, 2429 | J00245472 | ″ ″ ″ ″ 4.7 kΩ |
| R2442, 2444 | J00245562 | ″ ″ ″ ″ 5.6 kΩ |

| | | |
|---|---|---|
| R2402, 2424, 2446, 2449, | J00245103 | Carbon film 1/4W VJ 10 kΩ |
| R2458 | J01245103 | " " " TJ 10 kΩ |
| R2407 | J00245123 | " " " VJ 12 kΩ |
| R2405, 2433 | J00245153 | " " " " 15 kΩ |
| R2430 | J00245183 | " " " " 18 kΩ |
| R2443, 2450 | J00245223 | " " " " 22 kΩ |
| R2403 | J00245273 | " " " " 27 kΩ |
| R2408, 2412, 2421 | J00245333 | " " " " 33 kΩ |
| R2416 | J00245393 | " " " " 39 kΩ |
| R2427 | J00245563 | " " " " 56 kΩ |
| R2428 | J00245683 | " " " " 68 kΩ |
| R2417, 2426, 2451 | J00245104 | " " " " 100 kΩ |
| | | **THERMISTOR** |
| TH2401 | G9090003 | D33A |
| | | **CAPACITOR** |
| C2420 | K30176391 | Dipped mica 50WV 390 pF |
| C2416 | K02175390 | Ceramic " CH 39 pF |
| C2417, 2426, 2456 | K02175101 | " " " 100 pF |
| C2418 | K02175151 | " " " 150 pF |
| C2401 | K02179025 | " " " 220 pF |
| C2419, 2421–2423, 2428, 2429, 2434, 2436, 2437, 2440–2445, 2449, 2455 | K13170103 | " " " 0.01 µF |
| C2425, 2427 2430–2433, 2439 | K13170473 | " " 0.047 µF |
| C2451 | K50177102 | Mylar " 0.001 µF |
| C2407 | K50177222 | " " 0.0022 µF |
| C2410, 2415, 2435, 2438, 2447, 2448, 2449 | K50177103 | " " 0.01 µF |
| C2402 | K50177473 | " " 0.047 µF |
| C2414 | K50177224 | " " 0.22 µF |
| C2405, 2450, 2453 | K40170105 | Electrolytic " 1 µF |
| C2452 | K40140475 | " 25WV 4.7 µF |
| C2406, 2408 2409, 2424, 2454 | K40120106 | " 16WV 10 µF |
| C2446 | K40120476 | " " 47 µF |
| C2403 | K40120107 | " " 100 µF |
| C2413 | K40120227 | " " 220 µF |



| | | |
|---|---|---|
| | | **TRIMMER CAPACITOR** |
| TC2402 | K91000012 | ECV1ZW 10 x 32 10 pF |
| TC2401 | K91000013 | " 20 x 32 20 pF |
| | | **INDUCTOR** |
| L2401, 2403 | L1190016 | FL5H-101K 100 µH |
| L2402 | L1190017 | FL5H-102K 1 mH |
| L2404 | L1190038 | FL5H-271K 270 µH |
| | | **TRANSFORMER** |
| T2401 | L0020141 | R12-4171 |
| | | **CONNECTOR** |
| J2401, 2404 | P1090016 | SQ3056 |
| J2402 | P0090041 | 5048-03A |
| J2403 | P0090037 | 5048-08A |
| P2401 | P0090075 | P-7015 |
| | Q5000011 | Wrapping terminal C |
| | B4025945B | P.C.B. support D |

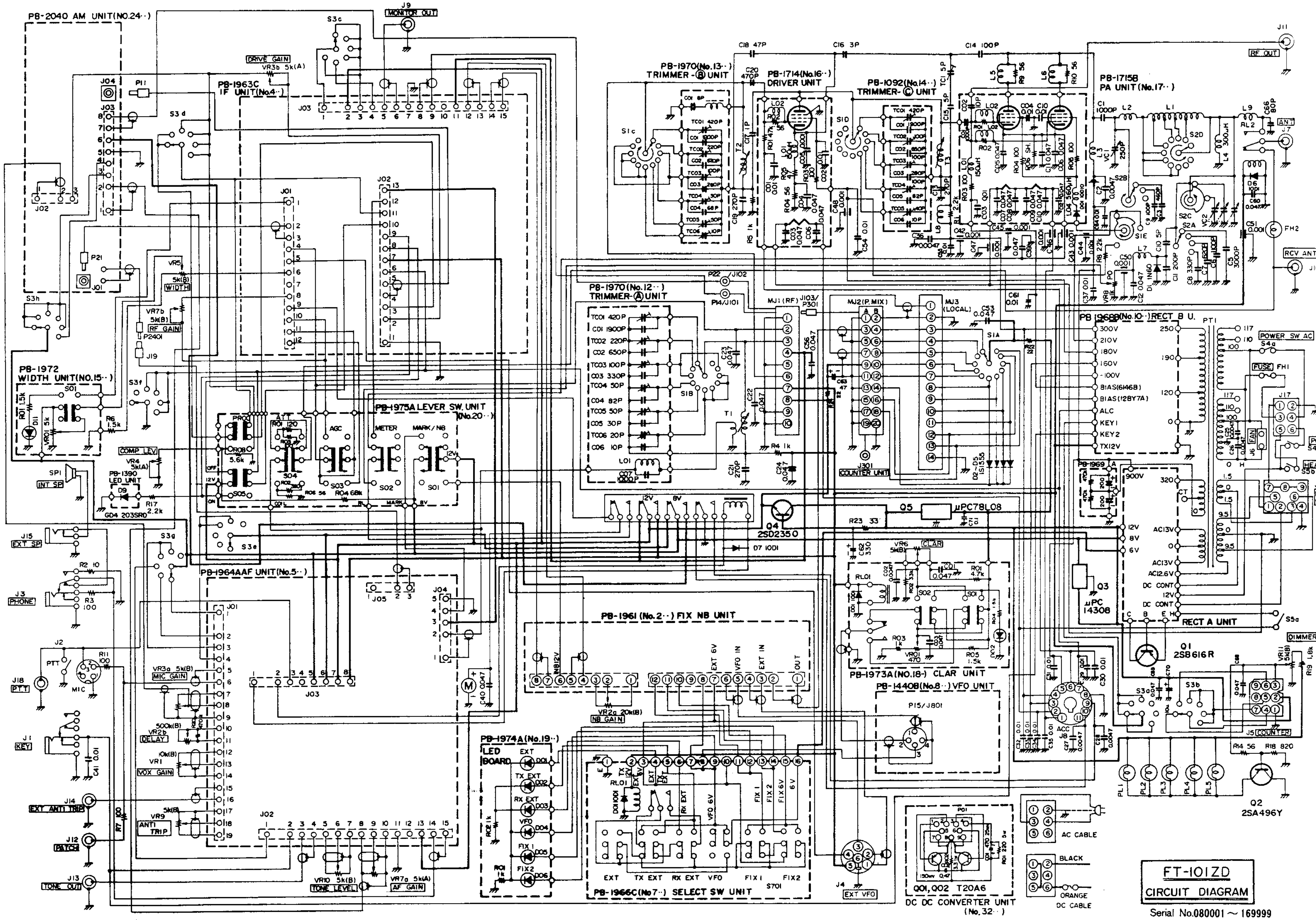
## FM UNIT (OPTION)

| Symbol No. | Part No. | Description |
|---|---|---|
| | C0022180 | P.C.B. with components |
| PB-2218 | F0002218 | Printed Circuit Board |
| | | **IC, FET & TRANSISTOR** |
| Q2506 | G1090072 | IC µPC577H |
| Q2501 | G3801250 | FET 2SK125 |
| Q2516 | G4800510C | " 3SK51-03 |
| Q2517 | G3107330Q | TR 2SA733Q |
| Q2503 | G3305350B | " 2SC535B |
| Q2502, 2504, 2505, 2507–2515, 2518 | G3309450Q | " 2SC945Q |
| | | **DIODE** |
| D2503–2506 | G2001880F | Ge 1S188FM |
| D2507 | G2015550 | Si 1S1555 |
| D2508, 2509, 2512–2515 | G2090027 | " 1SS53 |
| D2511 | G2090210 | Varactor FC63-4 |
| D2510 | G9090005 | Varistor MV13 |
| D2516 | G2090035 | Zener RD6.8EB3 |

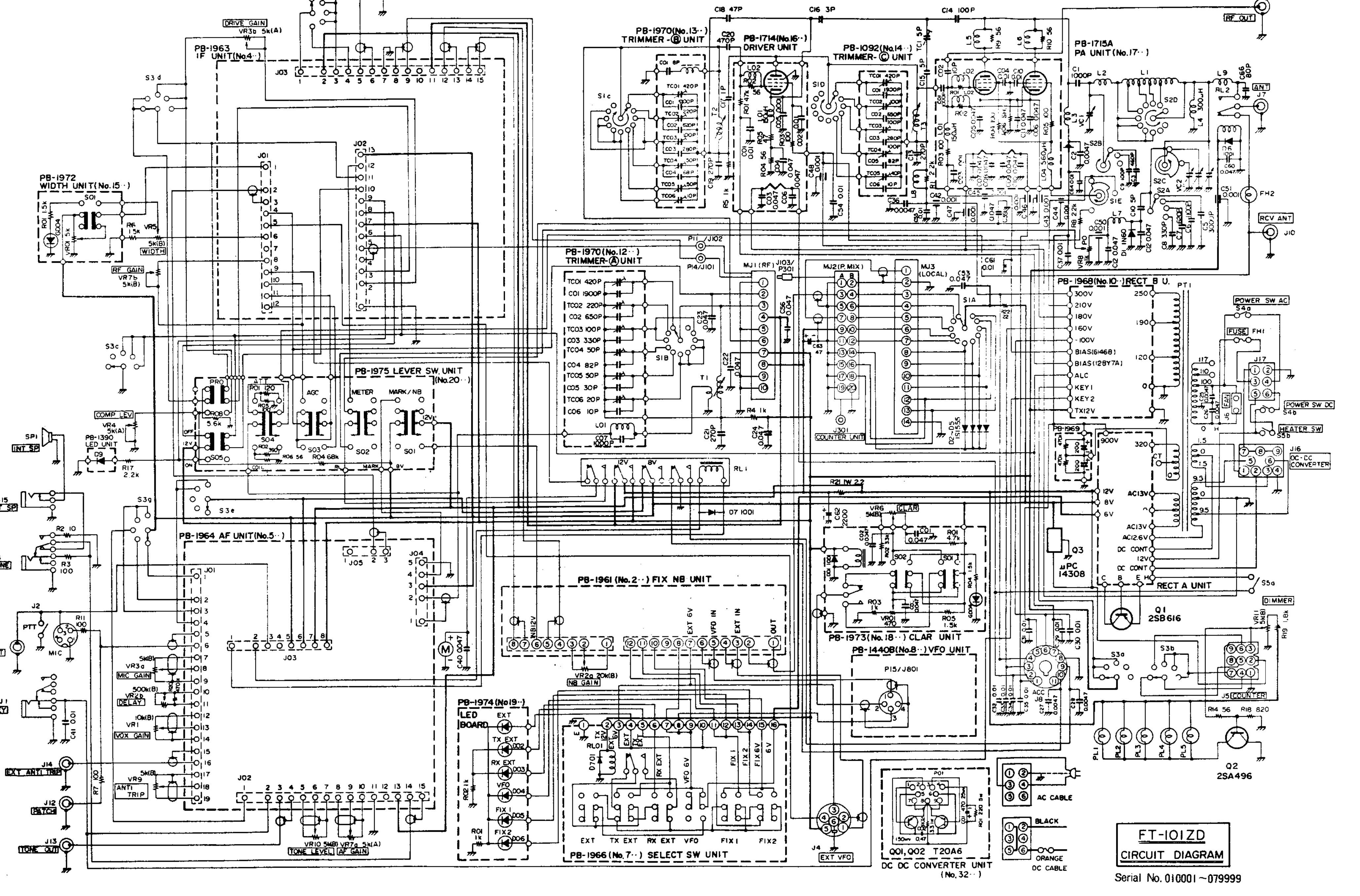
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| | | **CRYSTAL** |
| X2501 | H0100431A | HC-18/U 8532.5 kHz |
| X2502 | H0100440A | " 8988.3 kHz |
| | | **CRYSTAL FILTER** |
| XF2501 | H1100470 | 8.9M20A |
| | | **CERAMIC FILTER** |
| CF2501 | H3900200 | CFW455E |
| CF2502 | H3900030 | LF-B15 |
| | | **CERAMIC DISCRIMINATOR** |
| CD2501 | H7900040 | SFD455-S4 |
| | | **THERMISTOR** |
| TH2501 | G9090001 | SDT-250 |
| TH2502 | G9090003 | D-33A |
| | | **RESISTOR** |
| R2588 | J01254470 | Carbon film 1/4W TJ 47 Ω |
| | J00245560 | " " " VJ 56 Ω |
| | J00245820 | " " " " 82 Ω |
| R2502, 2503, 2508, 2548, 2565, 2569, 2574, 2575, 2584 | J00245101 | " " " " 100 Ω |
| R2554, 2564 | J00245221 | " " " " 220 Ω |
| R2557 | J01245221 | " " " TJ 220 Ω |
| R2563 | J00245471 | " " " VJ 470 Ω |
| R2549, 2568 | J00245561 | " " " " 560 Ω |
| R2507 | J00245681 | " " " " 680 Ω |
| R2515, 2546, 2555, 2573, 2577, 2581, 2583, 2586 | J00245102 | " " " " 1 kΩ |
| R2539, 2576, 2578 | J01245102 | " " " TJ 1 kΩ |
| R2534, 2540 | J00245152 | " " " VJ 1.5 kΩ |
| R2542 | J00245182 | " " " " 1.8 kΩ |
| R2516, 2517, 2519, 2521, 2522, 2524, 2532 | J00245222 | " " " " 2.2 kΩ |
| R2550, 2579 | J00245272 | " " " " 2.7 kΩ |
| R2530, 2541, 2544 | J00245332 | " " " " 3.3 kΩ |
| R2580 | J00245392 | " " " " 3.9 kΩ |
| R2514, 1582 | J00245472 | " " " " 4.7 kΩ |

| | | |
|---|---|---|
| R2504, 2525, 2526, 2533, 2543, 2560 | J00245562 | Carbon film 1/4W VJ 5.6 kΩ |
| R2505 | J00245822 | " " " " 8.2 kΩ |
| R2536, 2545, 2551, 2553, 2567 | J00245103 | " " " " 10 kΩ |
| R2572 | J00245183 | " " " " 18 kΩ |
| R2513, 2527, 2558, 2561 | J00245223 | " " " " 22 kΩ |
| R2559 | J00245273 | " " " " 27 kΩ |
| R2566 | J00245333 | " " " " 33 kΩ |
| R2506, 2538, 2562 | J00245473 | " " " " 47 kΩ |
| R2535, 2571 | J00245563 | " " " " 56 kΩ |
| R2501, 2552, 2570, 2587 | J00245104 | " " " " 100 kΩ |
| R2537, 2556 | J00245124 | " " " " 120 kΩ |
| R2518, 2520, 2529, 2531, 2585 | J00245154 | " " " " 150 kΩ |
| R2547 | J00245274 | " " " " 270 kΩ |
| | | **POTENTIOMETER** |
| VR2503 | J51721102 | EVL-S3A A00B13 1 kΩB |
| VR2501,2502 | J51721103 | EVL-S3A A00B14 10 kΩB |
| | J51721503 | EVL-S3A A00B54 50 kΩB |
| | | **CAPACITOR** |
| C2506 | K02179004 | Ceramic 50WV CH 3 pF (DD104CH030J50V02) |
| C2556 | K00175150 | Ceramic 50WV SL 15 pF (DD104SL150J50V02) |
| C2504 | K02179011 | Ceramic 50WV CH 27 pF (DD104CH270JJ50V02) |
| C2559 | K00175330 | Ceramic 50WV SL 33 pF (DD104SL330J50V02) |
| C2529 | K00175470 | Ceramic 50WV SL 47 pF (DD104SL470J50V02) |
| C2551, 2553, 2554 | K06175101 | Ceramic 50WV UJ 100 pF (DD106UJ101J50V02) |
| C2550 | K06175121 | Ceramic 50WV UJ 120 pF (ECC-D1H121UJ2) |
| C2507, 2508 | K02175151 | Ceramic 50WV UJ 150 pF (DD109CH151J50V02) |
| C2503, 2537, 2552, 2564–2566 | K13170102 | Ceramic 50WV 0.001 µF (DB201YF102Z5L2) |
| C2501, 2505, 2555, 2557, 2560–2563, 2569, 2571, 2572, 2573 | K13170103 | Ceramic 50WV 0.01 µF (DB201ZF103Z5L5) |
| C2502, 2512, 2558, 2574 | K13170473 | Ceramic 50WV 0.047 µF (DB207YF473Z5L5) |

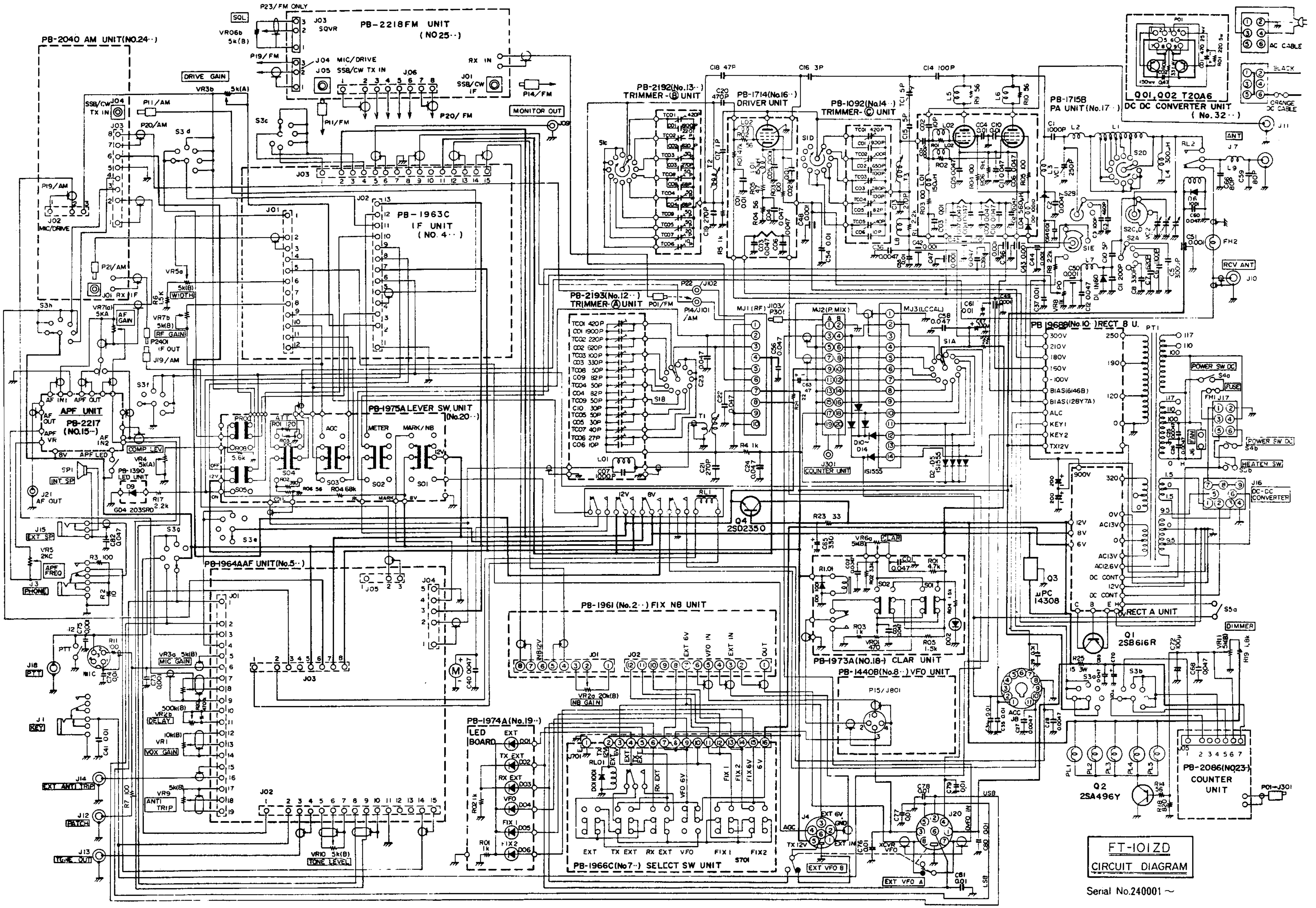
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| C2548 | K19149021 | Ceramic 25WV 0.047 F (UAT08X473KL46AE) | | | |
| C2515, 2530 | K19149025 | Ceramic 25WV 0.1 F (UAT13X104K-L46AE) | | | |
| | K51176101 | Styrol 100 pF (50SU101K) | | | |
| C2513, 2514, 2517, 2522, 2539 | K50177102 | Mylar 50WV 0.001 μF (50F2U102M) | | | |
| | K50177152 | Mylar 50 WV 0.0015 μF (50F2U102M) | | | |
| C2531 | K50177103 | Mylar 50WV 0.01 μF (50F2U103M) | | | |
| C2523–2525, 2535, 2538 | K50177223 | Mylar 50WV 0.022 μF (50F2U223M) | | | |
| C2527, 2528 | K50177333 | Mylar 50WV 0.033 μF (50F2U333M) | | | |
| C2516, 2518–2521, 2547, 2570 | K50177473 | Mylar 50WV 0.047 μF | | | |
| C2536, 2549 | K40170105 | Electrolytic 50WV 1 μF (50RL105) | | | |
| C2526 | K40140475 | Electrolytic 25WV 4.7 μF (25RL475) | | | |
| C2532, 2533, 2540, 2541, 2543, 2544, 2546, 2567 | K40120106 | Electrolytic 16WV 10 μF (16RL106) | | | |
| C2534, 2542 | K40129002 | Electrolytic 16WV 47 μF (16RE476) | | | |
| C2568 | K40120107 | Electrolytic 16WV 100 μF (16RL107) | | | |
| C2545 | K40109001 | Electrolytic 16WV 100 μF (16RE107) | | | |
| | | **INDUCTOR** | | | |
| L2501, 2502, 2504 | L1190017 | FL-5H102K 1 mH | | | |
| L2503 | L1190102 | S8-104K 100 mH | | | |
| | | **TRANSFORMER** | | | |
| T2501, 2502, 2504 | L0020140 | | | | |
| T2503 | L0020319 | | | | |
| T2504 | L0020221 | | | | |
| | | **CONNECTOR** | | | |
| J2501, 2505 | P1090016 | SQ3056 | | | |
| J2503, 2504 | P0090041 | 5048-03A | | | |
| J2506 | P0090037 | 5048-08A | | | |
| P2501 | P0090075 | P-7015P | | | |
| | P0090045 | SQ4052 | | | |



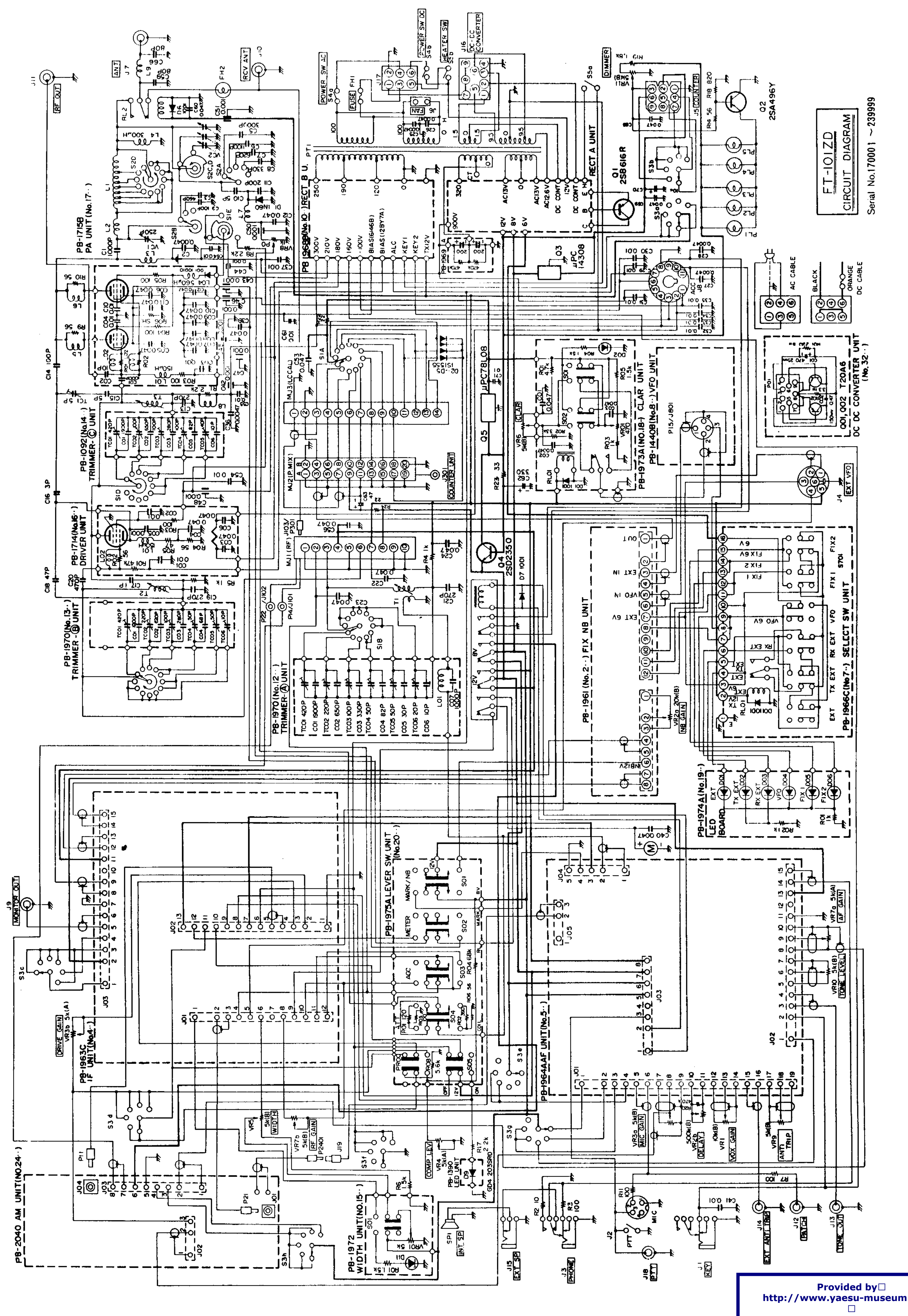

FT-101ZD
CIRCUIT DIAGRAM
Serial No.080001 ~ 169999




FT-101ZD
CIRCUIT DIAGRAM
Serial No. 010001~079999



FT-101ZD
CIRCUIT DIAGRAM
Serial No.240001 ~


FT-101ZD
CIRCUIT DIAGRAM
Serial No.170001 ~ 239999